TEXTILES PAPER LEATHER

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Including the Proceedings of the
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME XV MAY 17, 1926 NUMBER 8

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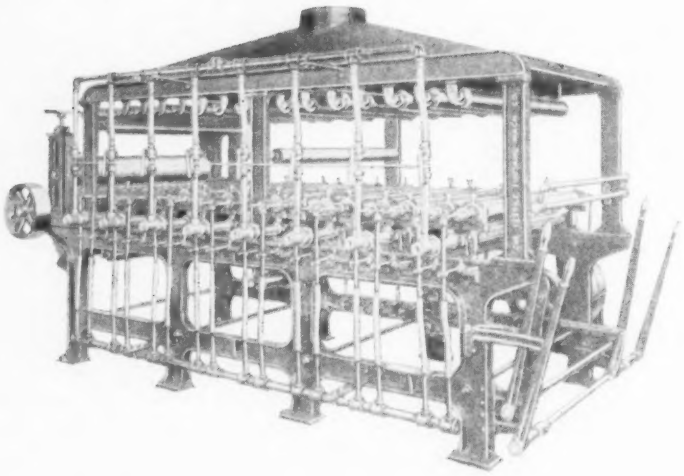

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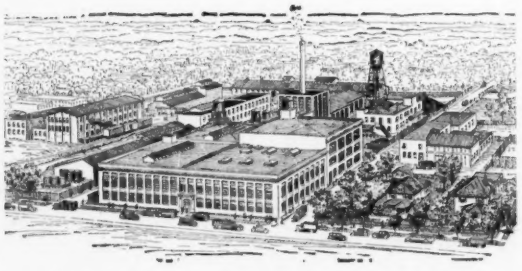

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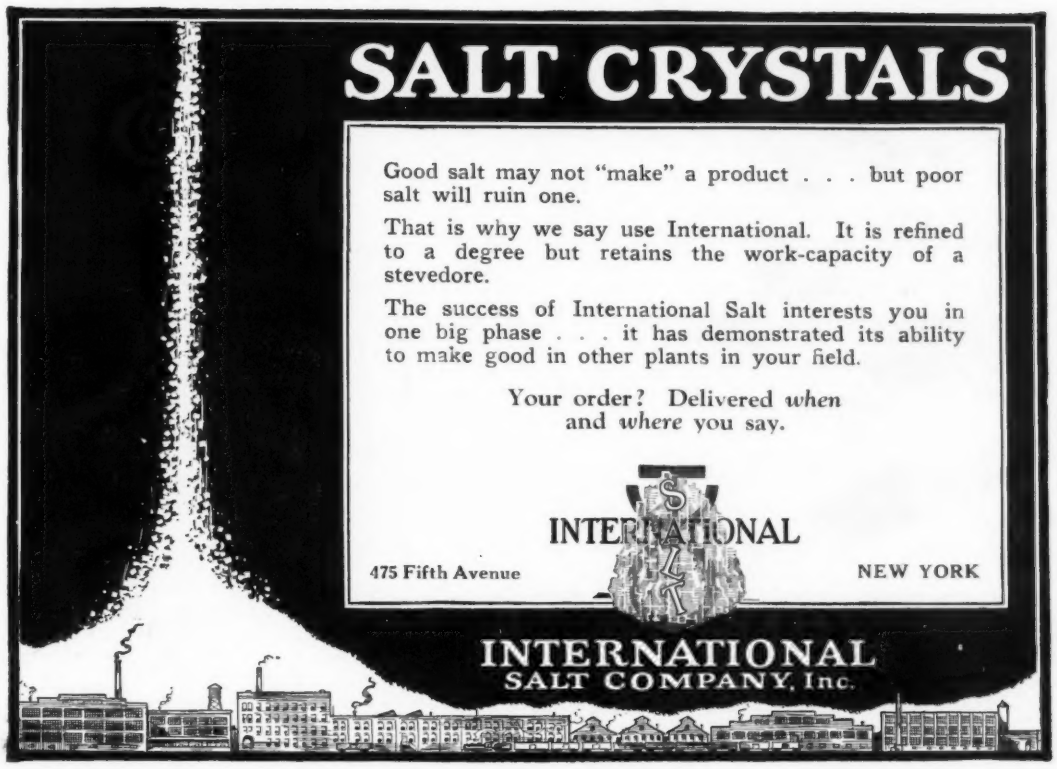
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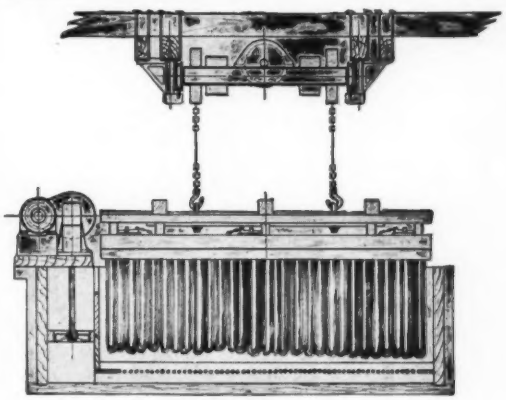

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*"Circulated Everywhere Dyestuffs Are Used"*

**Published by Howes Publishing Company, 90 William Street, New York.**

**Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.**

VOLUME XV | NEW YORK, MAY 17, 1926 | NUMBER 8


# Dyeing of the Insoluble Azo Colors

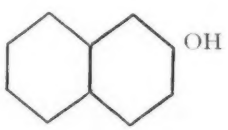
**General Characteristics of Insoluble Azo Colors—Fast Color Salts—Preparation of Beta-Naphthol Solution —Impregnation of Piece Goods—Drying—Development and Rinsing**

By O. W. CLARK and E. R. BORHO

THE insoluble azo colors are produced directly upon the cotton fiber by the union of a diazotized aromatic amine with a phenol. Until the last few years the most extensively used colors were produced by coupling various amines with beta-naphthol. Colors superior in their properties to those produced with beta-naphthol are obtained by using arylides of beta-naphthol carboxylic acid.

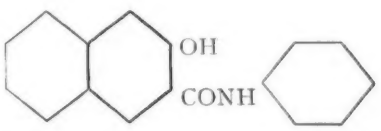
The general characteristics of insoluble azo colors are as follows: They exhibit marked brilliancy and fullness; they possess good fastness to light, soaping, chlorine and acids. Due to the mode of formation of the color and because of the poor substantivity of some of the naphthols, these shades may possess the defect of crocking. With properly dyed shades, and particularly when the most substantive naphthols are used as a ground, crocking should not be excessive, and in the most perfect combinations it will be negligible.

Beta-naphthol has been the most widely used phenol. It crystallizes in the form of leaflets and appears in commerce either in this condition or as a finely ground powder. When pure, it melts at 119 deg. Cent. The structural formula is



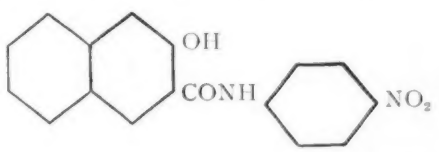

Of more recent utilization than beta-naphthol are the arylides of beta-oxy-naphthoic acid. The market now offers Naphthol AS, Naphthol AS-BS, Naphthol AS-RL, Naphthol AS-BO, Naphthol AS-SW, Naphthol AS-G, Naphthol AS-BR, and Naphthol AS-BG. Naphthols AS, AS-RL, AS-BO and AS-SW are of quite general use. Naphthols AS-BS, AS-G, AS-BR and AS-BG are satisfactory only in combination with specified bases. These naphthols form colloidal solutions. In the series Naphthol AS, AS-RL, AS-BO and AS-SW, the Naphthol AS becomes most dispersed and the Naphthol AS-SW the least dispersed. Whereas beta-naphthol has no affinity for the fiber, these newer naphthols exhibit some substantive properties, the substantivity varying inversely with the degree of dispersion.

Naphthol AS, the aniline of beta-naphthol carboxylic acid,



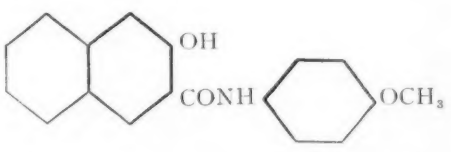

appears in commerce as a yellowish white powder.

Naphthol AS-BS, the para-nitro anilide,



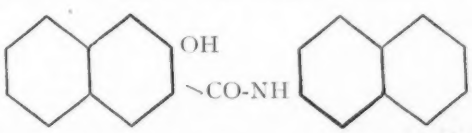

is a yellow powder. It produces bluer shades than Naphthol AS; but they are less fast to light, and hence Naphthol AS-BS is used chiefly for shading. Shades produced with Naphthol AS-BS discharge more easily than those produced with Naphthol AS.

Naphthol AS-RL, the para-anisidide,



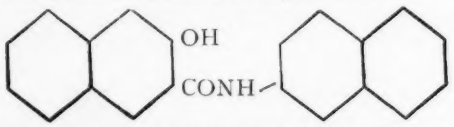

is a pinkish gray powder. Its chief use is with Fast Red RL Base for the production of bright pink shades of excellent fastness and low cost.

Naphthol AS-BO, the alpha-naphthalide,




is a light gray powder. For the production of shades ranging from a deep red to a dark Bordeaux it is very suitable.

Naphthol AS-SW, the beta-naphthalide,



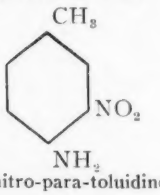

is a light tan powder giving a bright yellow solution with caustic soda. With the red bases it gives very fast red shades, much superior to those obtained with Naphthol AS. With Black Base LB a fast blue black is obtained.

Naphthol AS-G, diaceto acetic tolidide, is a light gray powder. It is used for the production of shades ranging from a clear lemon yellow to orange.

Naphthol AS-BG and AS-BR are the latest naphthols and are used for the production of brown shades.

A large number of amines have been placed on the market for use with the various naphthols. The trade names of Griesheim-Elektron, the most vigorous proponent of these colors, are here given, together with the chemical formulae where it has been determined, for the best known of the bases:

Fast Red G Base

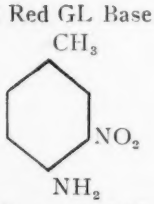



(Meta-nitro-para-toluidine)

Fast Red GG Base

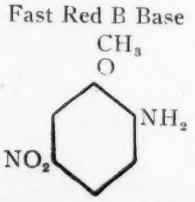
(Para-nitro-aniline)

Fast Red GL Base



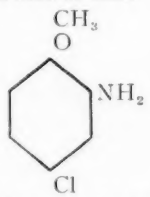

(Meta-nitro-para-toluidine)

Fast Red B Base



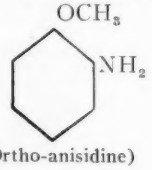

(5-nitro-ortho-anisidine)

Fast Red R Base



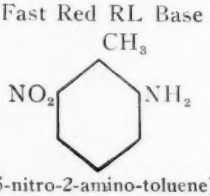

(Para-chlor-ortho-anisidine)

Fast Red BB Base



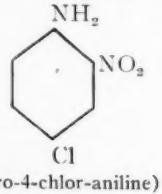

(Ortho-anisidine)

Fast Red RL Base




(5-nitro-2-amino-toluene)

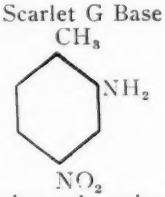
Fast Red 3GL Special




(2-nitro-4-chlor-aniline)

Fast Red KB Base

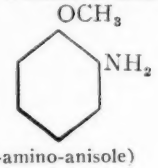
Fast Scarlet G Base




(Para-nitro-ortho-amino-toluene)

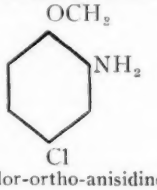
Fast Scarlet GG Base

Fast Scarlet B Base




(2-amino-anisole)

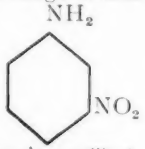
Fast Scarlet R Base




(Para-chlor-ortho-anisidine)

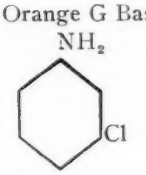
Fast Scarlet RC Base

Fast Orange R Base




(Meta-nitro-aniline)

Fast Orange G Base



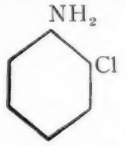

(Meta-chlor-aniline)

Fast Orange GC Base

Fast Orange GR Base

Fast Yellow R Base

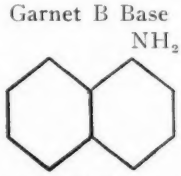
Fast Yellow G Base




(Ortho-chlor-aniline)

Fast Yellow GC Base

Garnet B Base



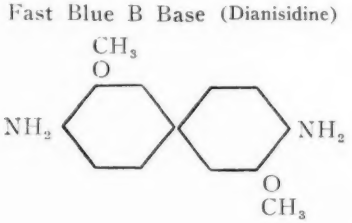

(α Naphthylamine)

Garnet G Base
(Nitro phenetidine)

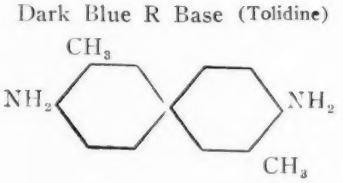
Garnet GB Base

Garnet GBC Base

Fast Blue B Base (Dianisidine)

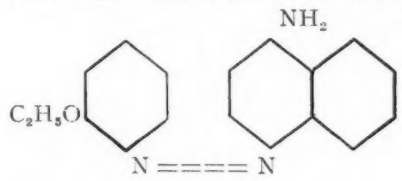



Dark Blue R Base (Tolidine)




Corinth B Base (Benzidine)

Black LB Base (2 ethoxy benzene azo alpha naphthylamine)




The most recent development is the production in stable form of the diazo compounds of many of these bases. These are on the market as fast color salts, usually about one-fifth the strength of the bases. Their great advantage is the simplicity of use, for they dissolve in water to form the coupling solution, no other preparation being necessary.

Available at the present time are:

Fast Yellow Salt G; corresponds to Fast Yellow GC Base.
Fast Orange Salt G; corresponds to Fast Orange GC Base.
Fast Orange Salt B; corresponds to Fast Orange R Base.
Fast Scarlet Salt GG; corresponds to Fast Scarlet GG Base and Fast Red GG Base.
Fast Scarlet Salt R; corresponds to Fast Scarlet RC Base.
Fast Red Salt 3GL; corresponds to Fast Red 3GL Special Base.
Fast Red Salt GL; corresponds to Fast Red GL Base.
Fast Red Salt B; corresponds to Fast Red B Base.
Fast Blue Salt B; corresponds to Fast Blue B Base.

The beta-naphthol solution is prepared by stirring beta-naphthol into hot water and boiling until well mixed. Caustic soda is then added and the solution boiled until clear. To improve the penetrative ability of the prepare liquor and to enhance the brilliancy and tone of the final shade, additions of sulphonated castor oil or castor oil soap are made at this point. The amount of caustic soda used is in excess of that theoretically necessary for the formation of sodium beta-naphtholate. The excess preserves the stability of the solution by providing a margin to compensate for the loss occasioned through reaction of the caustic soda with the carbon dioxide of the air. Too great an excess will retard the rate of coupling and will accelerate the decomposition of the developer. Castor oil soap increases the penetrative ability of the prepare and adds brilliancy to the shade. Sulphonated castor oil is a better penetrative aid than castor oil soap but gives a bluer cast to the shade. The beta-naphthol liquor will keep several weeks or even months in a sealed container.

The Naphthol AS series of prepare solutions require more care in their production. The naphthol is thoroughly pasted together with sulphonated castor oil until smooth and even. Caustic soda is then added, followed by boiling water, stirring constantly, and boiling if necessary. The sulphonated castor oil affects the dispersion of the colloidal naphthol, increases the penetrative ability of the prepare, and enhances the final shade. A small amount of a protective colloid, such as glue, may be added to improve the stability of the solution. To promote the level development of impregnated goods which are to be developed without intermediate drying, formaldehyde should be added at a temperature below 140 deg. Fahr. as otherwise a precipitate forms, which cannot be redissolved. After the addition of formaldehyde the naphthol liquor should be used at once. If the liquor must be kept a short time the formaldehyde should not be added until just before use. The Naphthol AS solution is the most stable and the Naphthol AS-SW the least stable.

The preparation of the diazo solution requires technical supervision and careful adherence to the correct conditions. The solutions are prepared by the action of nitrous acid on the hydrochlorides of the amino bases. The resultant diazo compounds are very unstable.

Beta-naphthylamine, amido-azo benzene, amido-azo toluene, and nitro-phenetidine are of little value for use with beta-naphthol. Beta-naphthylamine gives a fine red but is very fugitive and was only used before the utilization of para-nitraniline. Amido-azo benzene gives pale reds, inferior to Para Red in fastness to light. Amido-azo-toluene gives claret reds of good fastness to light but which crock very badly. Nitro-phenetidine gives a bluish pink of poor fastness to light.

Meta-nitro-aniline, nitro-toluidine, dianisidine, and tolidine have found some use with beta-naphthol. The fastness of these colors is not sufficient to warrant their extensive use.

The amines of real importance for use with beta-naphthol are para-nitro-aniline, alpha-naphthylamine, and benzidine. Para Red, produced with para-nitraniline in the past, has supplanted Turkey Red except for the very highest grade work. Although inferior in fastness to Turkey Red it possesses good fastness to light, washing, chlorine and crocking, and is much cheaper.

Alpha-naphthylamine gives brilliant clarets of good fastness. Benzidine gives a dull brown which is not as fast to light and crocking as the shades produced with alpha-naphthylamine. Mixtures of the two amines produce shades ranging from a bright claret to a dark wine.

Aniline, the toluidines, the nitro-anilines, the nitro-toluidines, the naphthylamines, benzidine, tolidine, the chloranisidines, and the nitro-anisidines should be diazotized at 32 to 40 deg. Fahr. This is accomplished by starting the diazotization at the temperature of melting ice and conducting it in the presence of sufficient excess ice to counteract the heat evolved by the reaction. Dianisidine should be diazotized at 60 to 54 deg. Fahr. Amido azo benzene, amido azo toluene, and nitro phenetidine should be diazotized at 68 to 86 deg. Fahr.

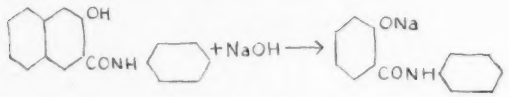
When the hydrochlorides of the amines are insoluble, to facilitate the reaction of the nitrous acid the hydrochlorides must be in a very fine state of subdivision. This

condition is produced by dissolving the amino bases in boiling acid and then very quickly chilling the solution with cracked ice, thus precipating a fine crystal meal.

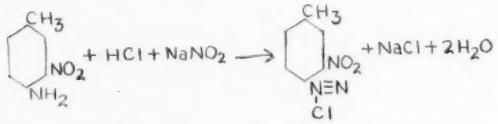
Just before use the free mineral acid must be neutralized.

The chemistry involved in dyeing insoluble azo colors is here illustrated with Naphthol AS and Fast Red G Base.

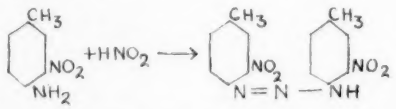
Solution of the Naphthol with caustic soda:



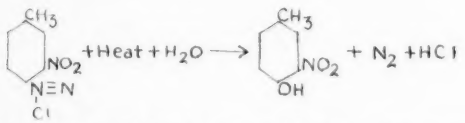
Diazotization of Red G Base*:



An excess of muriatic acid is necessary to promote a smooth reaction and to prevent the formation of diazo-amino compounds:



The amount of excess varies with each amine. A small excess of sodium nitrite is used to compensate for the loss of nitrous acid into the air. This excess must not exceed 10 per cent. The temperature must be carefully controlled. Elevation of the temperature causes the formation of phenolic bodies.

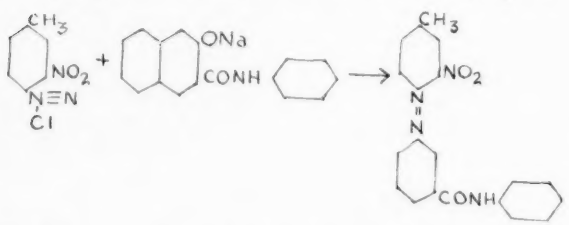


Neutralization of the excess acid with sodium acetate:

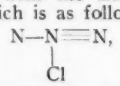
$$HCl + NaC_2H_3O_2 \longrightarrow HC_2H_3O_2 + NaCl$$

The presence of organic acid does not effect the coupling.

Coupling of the diazotized amine with the Naphthol

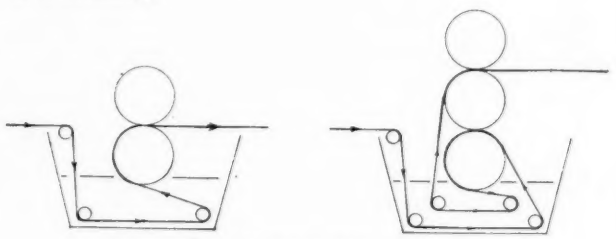


*Editor's Note.—While diazo compounds are sometimes represented in accordance with the Bloomstrand, Strecker and Erlenmeyer formula, which is as follows:



the Kekule formula, R—N = N— Cl, is more frequently used and may be more familiar to the readers of this article.

The impregnation of piece goods may be executed in a two or three bowl mangle or on the jig. With beta-naphthol and the less substantive naphthols of the AS series, mangle impregnation is preferable, and the three-bowl mangle is preferable to one with two bowls. The mangle should have a large box to retain the liquor which would otherwise be lost because of the rather considerable foaming of the liquor during impregnation. With Naphthol AS-SW the preparing may be done in the jig and the goods developed wet, without danger of excessive crocking.



*Impregnation*

In general, the following conditions will insure satisfactory preparation of the cloth. Impregnation at about 120 deg. Fahr. will assist penetration; but higher temperatures produce bare superficial dyeings by affecting the dispersion of the naphthol in the solution. The squeeze rolls should be heavily weighted to remove excess naphthol from the surface and to assist penetration. The development of loose surface naphthol produces dyeings which crock badly.

Beta-naphthol has no affinity for the fiber and the feeding liquor is of the same strength as the starting bath. Naphthol AS and its homologs possess some affinity for the fiber. The feeding liquor must be stronger than the starting bath, the amount depending upon the particular naphthol and the conditions at the mangle such as speed of the cloth, mangle pressure, length of the immersed portion of cloth, etc.

The prepared cloth must be dried evenly on both sides and must be thoroughly dry but not overheated. The drying cans are in series with the mangle as immediate drying is advisable to produce even shades. The temperature of the drying cans must be regulated carefully as the naphthols sublime at high temperatures, although Naphthol AS and its homologs are not so sensitive as beta-naphthol. The cloth may be dried with perfect satisfaction on bare cans, but they must be sufficient in number thoroughly to dry the cloth without resort to temperature sufficiently high to cause sublimation. If the cloth leaves the cans too damp, the final shade may crock badly. If the cloth is dried too hard, the penetration of the developing liquor will be hindered.

The dried prepared cloth should be developed as soon as possible. Cloth prepared with beta-naphthol turns brown on prolonged exposure to light and air resulting in dull shades. Cloth prepared with Naphthol AS and

(*Continued on page* 337)

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

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## SPRING MEETING OF THE SOUTHERN SECTION

The spring meeting of the Southern Section of the American Association of Textile Chemists and Colorists was held in the Grill Room of the Hotel Patten, Chattanooga, Tenn., April 17, 1926. The meeting was preceded by a dinner, at which about seventy-five members and guests were present. The meeting was called to order by Chairman Leonard S. Little, Pacific Mills, Lyman, S. C.

*Chairman Little*—My good friend Mr. O'Neil has kindly consented to introduce the gentleman who is to make the address of welcome.

*P. F. O'Neil*—Gentlemen, we are glad to have you here, and so glad to see that so many have turned out. We hope you have all enjoyed your visit. What few words I might say in welcome to you would be altogether insufficient; but in order that you might know that the citizens in general of Chattanooga are glad to have you here and happy to have you back, Commissioner Fred B. Frazier, Acting Mayor of the city in the absence of the Mayor, is here and is anxious to let you know we are glad to have you here.

*Mayor Pro Tem. Fred B. Frazier* (Chattanooga, Tenn.)—Mr. Chairman and Gentlemen: Mr. O'Neil told you that I was not the real mayor, and he is right about that. The real mayor had to be out of town and asked me to come down here to tell you how sorry he was that he could not be here; to tell you that if we did not make you feel at home here to-night, if you did not get everything you wanted up until to-night, then you should stay over and come around to see him; he will try to help you out.

I accepted this invitation to come down here several days ago; to-day I found myself forty miles up the road and hurried back so I could be here, because I felt that I would learn something by coming.

I think a convention of this kind means a lot to Chattanooga. We are glad to have you here, because you are interested in the line of work that Chattanooga is interested in. You are interested in a line of work that is helping to make us a big town, and I don't know but what some time or other we will probably call upon you to help us put something of your work in our public schools, because if we keep up in our schools we have got to prepare the boys and girls, the men and women of to-morrow, for the kind of work that they are going to be called upon to do. And as we are doing a lot of your line of work in Chattanooga, as you know, we are glad to have you here from that standpoint. And I know if I wanted to put a course of study along the line of your work in our schools, we would have to come to some of you men here to tell me how to do it and when to do it. For that reason I am especially glad to be here.

But you know we are always glad to have a crowd of specialists come here, for several reasons. We want to gain something from you, of course, and then we

want to show you what we have in Chattanooga that might be of interest to you.

We always have the hope—and we are not always disappointed, either—that when a convention comes to Chattanooga and becomes acquainted with us and we get acquainted with them, and they see our town and its advantages, there is scarcely ever a time but what some of them become interested in Chattanooga and probably become citizens of our town. For that reason—of course, it may be a selfish reason—we are always glad that you come.

Now, we feel that we have a great many points of interest, even outside your line of work. For, you know, this is a historical place—Civil War history was made here; some of the most important events of that war were prosecuted right around Chattanooga; and we trust that while you are here you will visit some of these scenes. Visit our mountains, our ridges, our battlefields, and see for yourself some of the points of interest at those places. And don't go back until you have done that.

I want to say, in conclusion, that we, of course, want you to feel at home here. That is what we want everybody to do. And I know this: that so far as the City Hall is concerned; so far as lies within our power, we want you to feel that we are glad to have you come, and if you will give us an opportunity to make you feel that way we will always do so. Those in charge of your entertainment here, if they do not do just what you expect them to do—just come up to the City Hall and tell us. If any of you get in trouble (laughter)—if any of you look around and find you cannot get what you want—come up and we will try to help you. (Applause.)

*Chairman Little*—I think we can all thank the Commissioner for his words of welcome. I can say on my own part, and I think I can speak for those who have not been to Chattanooga before, that coming here is certainly an inspiration. I do not believe any pure-blooded American citizen can come into a section like this and not go away inspired—not only to see this country from a scenic point of view; what also strikes me is the wonderful industrial development that is going on here. It is certainly remarkable. I am sure we are all glad to see it grow, and everyone here will be happy to see Chattanooga many times larger.

I have a couple of boys that have never been over here; and I will certainly bring them through this country, because I know it will be of benefit to them.

The first speaker of the evening is J. D. Murray, manager of the Franklin Process Company, Chattanooga, who will give you a talk on the Franklin Process.

## The Franklin Process System of Dyeing

By J. D. Murray

Gentlemen of the Southern Section, American Association of Textile Chemists and Colorists: The Franklin Process Company has a dyeing plant in England, one in Providence, R. I., Philadelphia, Pa., Greenville, S. C., and Chattanooga. The combined dyeing capacity of the several plants in this country is over 300,000 pounds of yarn per week. This fact probably makes the Franklin Process Company the largest job dyer in the United States.

The success of the Franklin Process system of dyeing may be attributed to the use of a compressible spiral or helical spring on which the yarn is wound, and dyeing in a closed kier under hydraulic pressure. This pressure varies from 10 to 25 pounds, depending upon the temperature of the dye liquor and also whether or not the packages of yarn are wound tight or loose. If the yarn is wound too tight some trouble may be had in getting certain shades, due to uneven penetration; and if the packages are too loose the dye liquor will channel between the ends of the packages instead of through them, and again result in uneven dyeing. The happy medium is attained when the packages are wound sufficiently loose so that no yarn will slough off while being handled during the winding or dyeing operations. A competent winder foreman experiences no trouble in making the correct type of package.

The compressible spiral or helical springs are placed on a Universal or Foster Winder, and a knit fabric cover or a perforated paper cover is placed over the spring and the yarn wound on the cover. These Franklin springs are 3 inches, 6 inches and 9 inches long. On No. 40's single yarns and finer, it is the usual custom to use the 3-inch Franklin spring. The 6-inch spring is generally used on coarser counts than 40's single yarn. Approximately one pound of yarn is wound on the 6-inch Franklin spring.

The packages of gray yarn are compressed on hollow perforated spindles on the dye kier and no yarn is removed from the kier until the dyeing operation has been completed. There is a sampler device attached to the top of the kier which permits sample swatches of dyed yarn to be pulled from the packages of yarn through the sampler cover at any time during the dyeing operation, thereby enabling the dyer to determine the correct shade with the minimum of trouble. After the yarn is dyed it is removed from these spindles which are in the dye kier and the surplus water is removed from the dyed yarn by means of a centrifugal hydro-extractor or an ordinary laundry wringer. This operation requires about ten minutes. Then the yarn is put in trays and placed in a drier.

The proper drying of the yarn requires from six to twelve hours. One of the larger packages would take twelve hours, and if wound on a 3-inch spring could probably be dried in six hours. The count of the yarn determines that.

If the yarn is for a weaving mill, it is taken directly from the dryers to the packing room and made ready for shipment. By using the Franklin Process system, the weaving mills can place any number of Franklin dyed packages in the warper creel to make up the required number of ends of the desired warp. This system makes the ordinary spooling operation unnecessary and, of course, quite a large saving in money can thus be effected, besides eliminating many knots. If desired, the yarn may be rewound from the Franklin package and shipped on six-inch paper tubes, four-inch braider tubes, filling bobbins or cones.

Dyed yarn for the hosiery trade is taken from the Franklin package and coned on a high speed machine.

The Franklin Process dyeing is quite different from the many other systems. When dyeing skeins or chain warps the material is dipped or passed through the dye liquor and this has a tendency to disturb the twist of the yarn. These two methods usually have poorer penetration of the yarn by the dye liquor because the bath is stationary, thereby causing uneven dyeing or staining, due to imperfect solutions. Another important difference in the contrasting of the Franklin system with skein or chain warp dyeing is the fact that the latter have such a great volume of liquor for the yarn to pass through, whereas the Franklin Process uses about one gallon of dye liquor to one pound of yarn, which gives the dyed yarn a greater brilliance. Especially is this true when dyeing the so-called "vat" or "fast to bleaching" colors. It must also be noted that in dyeing chain warps the yarn is given a hard twist to prevent excessive breakage. This is unnecessary in the Franklin system, as the soft twist yarn can be colored just as economically as the hard twist yarn. Any count and kind of yarn can be dyed by the Franklin Process.

The Franklin Process is used considerably in bleaching yarn. Due to the concentrated bath, the peroxide bleach can be employed nearly as cheaply as the chlorine bleach.

For the hosiery trade, the Franklin Process is very economical because it eliminates the waste caused by backwinding from skeins or warps. The yarn is under tension at all times so that it has no opportunity to allow any twist change.

The Franklin dyeing machines are made in various sizes from one pound capacity to 1,000 pounds. This wide range of machine capacities enables the hosiery manufacturer to order an exact amount of dyed yarn; of course this would be much more difficult with any other system of dyeing. It is readily seen how important this feature is when only a few pounds of yarn are needed for sample purposes.

The location of the Chattanooga plant in the very center of the South's hosiery industry will enable the hosiery mills in this section to order and receive their dyed yarn with the minimum of delay.

The Franklin Process Company has laboratory experts constantly experimenting on various effects, such as are produced by cross-dyeing, dyeing silk, etc., and all of these tests are available for the free use of our customers. I will thank you gentlemen to come out and visit our plant at any time.

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*Chairman Little*—I certainly wish to thank Mr. Murray for his paper. Mr. Bamberger, whom most of you know, has very kindly consented to show us the three-reel picture of the United States Finishing Company's plants, which is a composite picture, in connection with his talk on "The Dyeing and Finishing of Cotton Piece Goods."

## The Dyeing and Finishing of Cotton Piece Goods

By L. L. BAMBERGER

*Superintendent, Cedartown, Georgia Branch of United States Finishing Company*

Mr. Chairman and Gentlemen: I believe that the notice of this meeting spoke of the paper I would present, supplemented by a motion picture. That is not exactly true. I will present the picture, showing the finishing and dyeing of cotton piece goods, and supplement it by a short talk.

My object in making this talk is to point out the important points of the film and the process for those of you who may be totally unfamiliar with the handling of piece goods.

To those of you who are familiar with handling raw stock, there is a tremendous amount of work put on piece goods before the dyeing is attempted at all. This is necessary for several reasons. In the first place, very small irregularities in shade or finish are easily detected on piece goods which are not so easily detected on yarn, and practically never detected on raw stuff.

In the second place, those dyeing yarn and raw stock usually have to contend only with the impurities in the yarn or raw stock by nature, while the men handling piece goods not only encounter those, but worse, those put in by the weaver.

The cloth woven in this country, where our humidity is supposed to be unfavorable for weaving, where our experience is small as compared to that of England, is usually found to contain less impurities put in by the weaver than the cloth coming in from England.

This film is a composite film. Unfortunately to take

motion pictures requires good lighting effects. To take the picture it was necessary to take some parts of it in one plant, some in another where the lighting was favorable. Even at that in some operations you will notice the singeing is very poorly shown. That is, the plate singeing, putting the cloth at a high velocity over copper plates heated to red or white hot heat. This is not the only type of singeing. Some cloth is singed with gas flames, others with a combination of the plate and gas, and in that part of the reel which is shown in red, understand, that is what is being shown.

This film shows only one phase of bleaching, dyeing and singeing. To limit the film to three reels we were obliged to select the processes of bleaching, dyeing, printing and finishing. In other words, please do not get the idea that the process shown by the film covers all of the piece goods work. It does not. It covers fully the piece goods work in which there is dyed on the cloth a diagram. The cloth is later printed and finished in the usual manner.

In the bleaching end of the picture which is very freely illustrated by animated cartoons, I again want to caution you not to assume that this is the final and authentic process used in our plants.

That, by the way, is another process by which piece goods work varies from other dyeing work. There is more variation in the handling of piece goods than exists in the dyeing of yarn or other material. For instance, when we show the bleaching operations, especially those preceding the kier boil, the one we show represents only that used in one of our plants and does not represent the same thing used in our other branches.

So look the picture over carefully and if at the end anything is not understood, I will be perfectly willing to explain if I can. Any points you see on which you may disagree with us, I will be glad to discuss with you after the film is shown.

(Mr. Bamberger then showed the three reels.)

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*Chairman Little*—I think that we have all enjoyed the picture, that it has been one of the most interesting features. Personally I felt very much at home as I was trained in two of those plants for seven years, and it was a happy experience I had there.

At this point we have usually had a short period of discussion. If there are any questions you would like to ask either of the speakers, we should like to have them. I hope the questions will be absolutely to the point and purely technical. If there are no questions, is there any special subject you would like to bring up, perhaps outside of the two topics we have had to-night? I believe there are one or two matters of business which we might consider at this time. Mr. Stone has a matter he would like to bring before us.

## Discussion of Division of Southern Section

*Mr. Stone*—Mr. Chairman, six months ago at our meeting in Greenville the question of separating the South into two territories, so that there might be two sections of the Association holding forth down here, was discussed. My recollection is that it was the consensus of this section that such a separation would be helpful, because it would enable the members from both sides of the mountain to attend meetings regularly. At that time it was found there were not quite enough members west of the mountains, or in that territory that it would be proper and logical to set aside as a new section, to enable that territory to apply and get a charter or have a section assigned. That situation is now changed. We understand from the Secretary that the section which might be set apart for the creation of a new section has about fifty-one members, and there are several dozen applications in. We can assume at least half are from this side of the mountain, which would be ample for a section west of the Alleghenies.

If it is still the opinion of the members of this section that the South should be divided into two sections, I think the matter might properly be revived here to-night and the proper steps be taken in due course for the creation of two sections out of what is now the Southern Section—one section to take in the territory, we will say roughly, west of the Alleghenies, the other to take in the territory east of the Alleghenies.

Some gentlemen have pointed out that if there were a section west of the Alleghenies, embracing Tennessee, Alabama, a portion of Georgia and a few mills west of these States, there are three central locations in which meetings might be held that would be convenient and all members of the Association could attend the meetings with much less loss of time and expense, both of which have to be considered. If the section were over here, Atlanta, Chattanooga and Knoxville would no doubt be considered as the logical places in which to hold the meetings. They are all fairly convenient to the territory from Macon, Ga., to Johnson City, Tenn.

On the other side we would have Greensboro, Greenville and Charlotte lined up, as compared to the towns over here, where the meetings might be held and all of the members have the opportunity of attending with fair degree of regularity, and without much loss of time and without much expense.

If Mr. O'Neil and the gentlemen this side of the Alleghenies still feel a divorce is in order, I feel, Mr. Chairman, that it would be in order for the expression to come from the gentlemen on this side of the moun-

tains; and if that expression is still favorable, then it would seem that a motion is well in order to lay before the parent association requesting that the name of the present section be changed so that we would have a section on the other side of the mountains—the Carolina section, if you please—and a section on this side of the mountains which would be named in accordance with the wishes of the gentlemen over here, just as the other would be named in accordance with the wishes of the gentlemen on the other side. Would Mr. O'Neil and the gentlemen express themselves?

*Mr. O'Neil*—Gentlemen: We have discussed this question before at one of our meetings—I believe, at Asheville—and, strange to say, the initiative of the subject came from men who are east of the Alleghenies, not men west of the Alleghenies. However, it was in line with the sentiment I found to be very general. The gentlemen on this side of the mountains thought the distance they were called upon to travel to attend the meetings was too great—took too much time, and too much money. The associations we have had with the men from the other side have always been very pleasant; we have always been glad to be with them, and there has been nothing but good fellowship, good feeling and co-operation shown at all times. Still, a great many young men who are not occupying positions as remunerative as some others cannot spare the time or money to attend the meetings; and it was generally thought that, under those circumstances, if the section were split into two it would be of much greater benefit to those concerned. The fellows on this side would have the opportunity of getting together oftener and meeting oftener, deriving greater benefit.

That was taken up at the Asheville meeting, and it was the consensus of those there that this should be done, and I believe the Secretary was instructed to communicate with the National Secretary in regard to the matter. He did so in a roundabout way with Dr. Killheffer, one of the National Council, who was at that time opposed to it.

However, now that the membership has increased so much, it is my opinion that a sufficient number of members can get together, get up a petition and send it to the National Council asking for a charter for any particular section, giving their section any name they wish. So it seems to me that the program would be a very simple one.

However, it would show a very good spirit and be more desirable if our fellow members from the west would agree to divorcing us and splitting up, that it be shown there has not been any hard feeling engendered nor anything of that sort. It is merely a matter of convenience, a plan devised to give all of the members an opportunity to derive any and all benefits that may be derived from attending the meetings and from meeting the fellows in the same line of business frequently, which they cannot do under the circumstances as they exist now.

I believe it is the thing to do. There is no strenuous opposition to the split. I think it would be a very good idea for this meeting to pass a resolution providing for that and have that transmitted to the National Council so that when we over here get together and decide to send in a petition it will be understood that it is agreeable to everybody.

*Chairman Little*—The idea as I understand, is to take in largely Tennessee and Georgia as the large units. Possibly a part of Georgia, such as Augusta, Georgia, would be better in the old section than the new. It is largely a matter of geography. Of course, Alabama would go with the new. I think it well at this time to get opinions from the members in the new section, so to speak. I will ask anyone here in the new section—west of the Alleghenies—if he feels this is an unwise move, to stand up and express his opinion. We do not want to be divorced if they are unhappy. Is there anyone here who feels this is not a wise move?

*Mr. Stone*—Call on Mr. Bamberger.

*Mr. Bamberger*—I am heartily in favor of the move. For instance, at our last meeting, Mr. Taylor and I made the trip; I from Cedartown, he from Newnan. We traveled about twenty hours to get there, and coming home made the trip well over two days to get there and back. It was well worth the trip. At the same time it is a trip all of us cannot take. I certainly think it a wise move when we have sufficient members in this part of the country. I think we have fifty-one with the possibility of twelve more. There is considerable interest on this side of the mountains, especially in the vicinity of middle Georgia, in and around Griffin, so I think anything we can do to further the idea is well and the sooner the better.

*Chairman Little*—I think the section has expressed approval of the move. I think it well we make a motion that we recommend such a movement.

*Mr. O'Neil*—I will make the motion— but perhaps it will be better from a member of the Eastern section. I waive to Mr. Stone.

*Mr. Stone*—I, as a member of the trans-Appalachian group, move that it is the opinion of the Southern Section, in the interest of the members of the Southern Section of this Association, and to the benefit of the industry which engage the members of this Association, that the Southern Section be divided into two sections, letting the Allegheny Mountains be the substantial dividing line between the two sections; that the secretary be so instructed to inform the parent association.

Is there anything else that we may add to such a motion?

*Member*—Will you kindly state what you mean by the dividing line of the Allegheny Mountains?

*Mr. Stone*—All right, we will let the line between North Carolina and Tennessee, between South Carolina and Georgia, until we get to Augusta, Georgia, into the eastern section, and everything west of that, from Johnson City on down to Macon, Georgia, including Macon, in the western section. That is my opinion. My opinion, of course, cannot prevail. It will depend upon the action of the Council I presume, as to where the line might be drawn.

*Chairman Little*—Would it not be well to suggest the line to be mutually agreed upon between the two sections? We cannot foresee at this time all the little variations in the line until the two sections get together. I do not think the National Council would object to that.

*Mr. Stone*—I do not think so.

*Mr. O'Neil*—I do not think we need go into detail in that connection because the National Association has always consented, if for any reason a particular member might be in one section, yet because of some arrangement found it more convenient to attend another section.

(The motion being duly seconded was put and carried.)

*Chairman Little*—It is a vote. Is there any other new or old business to come before the meeting?

*Mr. Stone*—Mr. Chairman, perhaps this meeting might have a statement from the chair regarding the annual meeting.

*Chairman Little*—It was my pleasure not long ago, possibly six or eight weeks ago, to have a talk with Professor Olney, president of the Association, with regard to having the national meeting in the South. I sent him on Wednesday a very complete outline of what we proposed to do, sending him time tables and things of that sort, recommending that December 3 and 4 be the time of the annual meeting. In talking with Professor Olney, he said the association is composed to a large extent of young men of limited means, and young men who would like to come to see our country down here. Therefore, he felt that the meeting should be at a point which is central but not too far away from New York and New England. He therefore thought that Charlotte would be the logical place for us to meet, and that we could arrange side trips to the other sections of the country according to the desires of the members, and said that he would send out a questionnaire to try to find out where each one wanted to go. For instance, it was suggested that those who would like to go to Greenville come down the day before, getting in Greenville a little after twelve. The chamber of commerce has kindly consented to give a dinner. This group could make side trips, meet the Greenville people in Spartanburg and return to Charlotte a little after eight, being ready for the meeting at 10.30. The idea is that possibly two sections of trains would make up, one from New England, coming to Washington, getting on the Piedmont Limited; and of course those in the section of Philadelphia would probably get on the Piedmont at New York or en route to Washington, then have two cars coming down here. That would possibly be enough to cover it. I have not yet received a telegram from Professor Olney; I asked him to wire me. So I have nothing definite, but unless we hear to the contrary, it will be approximately that time of the year and will probably be on Friday and Saturday of the week, allowing the men to get back to their work by Monday. It was arranged at the last meeting that we would appoint the present arrangements committee in charge, and will call on a number of men in the section of Charlotte to help us out. I trust that meets with the approval of the section. I should be glad to hear criticism or suggestion along that line. If there is no criticism, I would like to have the definite motion from the section approving this action.

*Mr. O'Neil*—Has this section ever officially invited the National Association?

*Chairman Little*—Yes.

(The motion was duly made, seconded and carried that the report of the Chairman be accepted.)

*Chairman Little*—Is there any further business? I think before we adjourn, Mr. Barnhart has some very interesting samples of Celanese which he would be glad to show the members. I understand it will be of interest to some of the members. We try to keep anything before the membership that would be of interest. It is not a selling or advertising scheme, but purely a matter of information.

*Chairman Little*—I think Mr. Stone has a motion or two to make before adjourning.

*Mr. Stone*—Mr. Chairman, as chairman of your Arrangements Committee, which is also the Membership Committee, I naturally want to speak as I have at every previous meeting about the desirability of getting new members for the Southern Section.

It is extremely gratifying to those of this section who have spent some time, some effort and perhaps a little money on the section, to note that this section has grown from a beginning of between 25 and 30 members to 110 or 115 members to-day, and as our secretary informs us that we have forty or fifty applications in, there seems to be a prospective membership in sight of over 150 members. That is extremely gratifying to those men of this section who have put some effort into it. But, gentlemen, we must look upon what we have done as merely a beginning. I said at the first meeting of the section in the South that it is the job of this organization to transfer or transplant the dyeing and finishing industry into this section on the same basis as is the fabrication industry.

The Government tells us we spin and weave two-thirds of the cotton spun and woven in the country. We are dyeing and finishing much less than that. It is the duty of this organization to so develop the ability necessary to dye and finish that we may have the same percentage of dyeing and finishing in the country.

It is helpful to the men who are in it. It is helpful to the men who come and attend the meetings. It is helpful to the executives who are merely "yes-and-no men" in the organization. Let us get the members who will come here and do their part, prepare and read papers, present subjects and discuss them. That is the class of members we want in this association, and, gentlemen, it is up to every one of you to try and get other members just as good as yourselves. It is not merely the duty of the Membership Committee to get members; it is the duty of every member of this organization to help get members, and I think we will all benefit by doing that very thing. So much for that.

We have had some very interesting papers, talks, entertainment, and pictures this evening as the result of the kindness of Messrs. Bamberger and Murray, and Mr. White and his orchestra. I think a rising vote of thanks for what they have done is in order and I so move.

(The vote of thanks was extended by rising.)

*Chairman Little*—If there is no further business we will entertain a motion to adjourn.

(The motion was put and carried by a rising vote and the meeting adjourned.)

## APRIL MEETING OF THE NEW YORK SECTION

The regular monthly meeting of the New York Section of the American Association of Textile Chemists and Colorists convened after the usual informal dinner, on Friday evening, April 23, 1926, at the Machinery Club, 50 Church Street, New York City, Herbert Grandage presiding. About seventy were present.

After the routine business of the Section was transacted Chairman Grandage introduced the first speaker.

*Chairman Grandage*—Mr. S. L. Hayes, who is a member of the New York Section, and needs no introduction to our members, will present for us the subject of "Dyeing of Cotton Piece Goods with Mineral Khaki." Mr. Hayes! (Applause.)

*S. L. Hayes*—Mr. Chairman and Gentlemen: Before I start on the paper proper, in order to try to make it a little easier for you to follow me, I have a bunch of samples here which I will pass around. As Mr. Howes told me that there would be about forty-five here, I prepared fifty samples, but I think I am going to be a little short. There will probably be enough, however, for every other person to have one. I will refer to them during the course of my remarks.

. . . Mr. Hayes then presented his prepared paper:

## Dyeing of Cotton Piece Goods with Mineral Khaki

By S. L. Hayes
*Bronx Finishing Company*

Mineral colors on cotton have become less and less used since the introduction of the aniline colors. This is due to the greater range of shades, the greater brilliance, the greater ease of application and in some cases to the greater fastness and lesser cost of Yellow, Chrome Orange, Chrome Green, Manganese Bronze, Prussian Blue and Mineral Khaki. This paper deals with Mineral Khaki and slight variations of the same. By Mineral Khaki is meant the color obtained through the fixation of, in the main, salts of iron and chromium on the cotton fibre.

The word "khaki" is derived from the Urdu, or Hindustani word "khaki," meaning dust. It was originally a dust colored fabric used by the British and native troops in India. At first it was probably dyed by immersion in the muddy streams of India, later with wood colors and finally as developed in England with salts of iron and chromium.

Fabrics of this general shade were developed about 1848 by Sir Harry Burnett Lumsden for the "Guides," a mixed frontier regiment in India. It was used in the Indian Mutiny of 1857-58 and gradually developed until it became the standard color for uniforms in India, Asia, and South Africa. The dyeing of the same had also developed until at the time of the Boer War and Spanish-American War it was being dyed with mineral colors.

The word khaki now means any shade of tan or olive drab on twills or drills used as a clothing fabric whether dyed with direct, basic, sulphur, vat, or mineral colors. We shall confine ourselves as stated above to the so-called Mineral Khaki.

### Raw Materials

The raw materials usually employed are ferrous acetate, chromic acetate, sodium carbonate, sodium hydroxide and soap. There are a few exceptions which will be referred to later.

You can see from the raw materials that we get away from most of you dyestuff men. (Laughter.)

The ferrous acetate can be made by the reaction between ferrous sulphate, or copperas, and calcium acetate, but when so made it does not form a stable solution, being easily oxidized and converted into the basic ferric acetate which is insoluble. It is usually prepared by saturating crude acetic acid with iron turnings until a dark olive green liquor of about 18 deg. Tw. is obtained

It is also sold under the name pyrolignite of iron and in the manufacture pyroligneous acid or crude acetic acid must be used. It is claimed by some that there are tarry organic substances of a reducing character present which prevent the oxidation to ferric acetate. Another theory is that a double salt of the acetate and the magnetic oxide of iron is formed which is stable in the acid solution while others claim that pyrocatechin $C_6H_4(OH)_2$ is present in the crude acid and the iron salt of it is formed, giving its olive green color to the solution and preventing oxidation.

The chromic acetate can be made from chrome alum and lead acetate, but is usually made by the reduction of sodium bichromate with glucose and sulphuric acid in the presence of acetic acid. It is a greenish liquid usually standing about 36 deg. Tw. and containing about 8.33 per cent CR 203.

The process is: Preparation of the goods, then passing through a padding machine containing the mixture of acetates and water, drying, aging, washing, drying and finishing.

We will now discuss these stages separately.

### Preparation of Goods and Padding

If the goods contain starch they are desized, washed and dryed. Care must be taken in the desizing that, in case the goods are put on trucks, the edges do not dry. Air stains will develop which will afterward show. It is best to keep the goods when wet in roll form. If the gray goods are particularly dirty and require bleaching it should be done in open width.

The sample marked "A" represents gray goods ready for the acetate solution. That sample, however, has not been treated with any desizing agent as it is an army duck, 30-inch—8.42-ounce—army duck. Therefore it contains no starch in the warp and requires no preliminary treatment. I might mention that samples "B," "C" and "D" are not the same fabrics as the sample marked "A." They are either 7 or 8 inch single filling ducks, and in this particular case they have not been desized, although if you are required to have a very soft finished fabric it will be necessary to desize in case the cloth contains any starch.

The goods are passed through a mixture of the two acetates. The liquor is cold, that is, room temperature, as heat will cause the decomposition of the ferrous acetate. Sample marked "B" shows goods which have passed through the chrome-iron solution. In this case the proportion was chrome acetate, 20 per cent; iron acetate, 40 per cent; water, 40 per cent. The goods should have good contact with the chrome iron mixture. Sample "B" represents simply a passage through this solution and then drying. The color is the natural color given to the cloth by the chrome and iron acetates, and in that sample the iron and chromium is present in the form of the acetate. Sample "B" is on the acid side. The dye liquor being cold and the goods being in the vast majority of cases not bleached means you must give it every opportunity to soak into the cloth. We would recommend a three-bowl padding machine and running the goods through twice. It is desirable to batch up the goods on the padder and not try and run the padder in conjunction with a set of cans. If this is done it adds many difficulties to the next stage—that of drying. The batching up of the goods after going through the iron and chromium acetates apparently gives the cold liquors plenty of time to soak thoroughly into the fiber and you get better penetration, more even penetration. In fact, it is my opinion that you cannot do mineral khakis on heavy fabrics except by batching up.

The drying of the treated goods between the treatment with the dye solution and the aging is very important as at this step the goods can easily be spoiled. Reference has just been made to the advisability of batching the goods on the padder. If the goods go straight to the cans, the dye liquor being cold and the goods being relatively non-absorbent, the dye liquor is on the surface, and in drying in this condition the goods are apt to develop "can burn." I have two samples here which show "can burn." The large sample shows it before it has been washed, the small sample after it has been washed. If you will notice carefully you will see that one side of these fabrics shows this "can burn" more than the other, that side being, of course, the one which was against the drying cans. You can't see it very plainly in this light but in daylight it is very noticeable. At the same time, I will pass around these two samples which show the effect of water spots. At the stage represented by the sample marked "B," where the iron and chromium is on the fiber in the acetate condition, they are, of course, soluble and water getting on will dissolve the acetates. If you get enough on it will leave a white spot. If you get a small amount on it will form a ring. I have two samples here, one before the washing, one after the washing, and the water spots are very noticeable. This is illustrated by the large sample passed around marked "can burn." On this particular piece the spotted, streaked appearance was produced purposely, but unfortunately it is produced at times when you least desire it. The same condition is caused by drying at too rapid a rate. This is controlled by lapping the first few cans with cloth, which keeps down their temperature, or by using lower pressure steam in the first few cans or—as is best—by a combination of the two.

To summarize the first two stages: It is highly desirable to do everything which will insure thorough and

complete penetration of the dye liquor and to dry the goods slowly with as low a primary temperature as is possible.

### Aging

The next procedure is the aging. Sample marked "C" represents the fabric after aging. Please note the change in color which is the first step in the development of the final shade. Aging consists in passing the goods through an ager of the well-known Mather and Platt type for from four to eight minutes at a temperature of 212 to 214 deg. The aging serves two purposes: It drives off the excess acetic acid and causes at least a partial development of the hydrates of iron and chrome.

In the sample marked "C," the iron and chromium are probably present as the iron and chromium hydroxides or possibly as a double salt of iron and chromium.

It is possible to dye mineral khaki without aging but the next step of washing and soaping is rendered more difficult and more costly—more difficult because the aging converts part of the iron and chromium into an insoluble form and there is less which washes off in the soaping. It is much easier to control the uniformity shade on goods which are well aged. The aging reduces the cost as it is self-evident that there being less acetic acid in the goods the amounts of alkali used will be much less.

It might well be asked how far the aging can be carried It is doubtful if you gain much when the goods are steamed over eight minutes. I have some samples here which go more or less in pairs. The proportion of iron and chromium content and the length of time that they were steamed are marked on each one. In each case there is one sample which was steamed for thirty-five minutes and one sample which was steamed for seventy minutes. If you will notice these, you will also see the different color obtained by using various amounts of iron and chromium. We have passed samples around showing the effect of steaming for an additional thirty-five and seventy minutes, and while there is additional development there is hardly enough to warrant the extra procedure. It might be added, however, that there is no doubt in my mind that this extra thirty-five or seventy minutes' steaming or aging would make it easier to control the shade. that is, the uniformity of shade, although, frankly, in doing it we don't go to that expense.

We compared this week records taken about eight years ago in dyeing mineral khaki without an ager with records taken this week in dyeing about the same shade of khaki with an ager. They show that aging makes a difference in the amount of iron and chrome used, and in the amount of soap, caustic, and soda ash used, the large saving being due to the acetic acid being driven off in the ager in one case and neutralized with alkali in the other.

In round figures the aged goods required about 30 per cent less chrome acetate, 10 per cent less iron acetate, and about 40 per cent less alkali. The greater saving in chrome acetate over the iron acetate is due to the greater solubility of the chrome acetate which therefore washes out more when not aged, and it is also probable that aging has more effect on the chromium compound. In addition, it is probable that the drying on the dry cans has more effect in converting the ferrous acetate to the ferric or insoluble condition than it has in converting the chromic acetate into the hydroxide, and therefore it shows up more.

The next operation is that of washing or soaping. We have done this in continuous boxes of from four to eight compartments and also on jigs. A continuous machine is without doubt the proper way, and if you will refer to sample marked "D" you will see the effect of soaping. Sample marked "D" is a sample which has been soaped. By soaping I mean it has been given the general treatment with soda ash, caustic soda and soap. This converts the iron and chromium acetates into the oxides, and so far as the shade is concerned is the final step. The soaping process, if thoroughly carried out, means a complete neutralization of all the acid in the cloth and a complete breaking up of the acetates.

We have seen samples of Mineral Khaki which apparently presented the strange paradox of getting heavier upon soaping. This meant that the particular sample in the processing had not been fully developed and further soaping merely did what should have been done in the dyehouse.

In general you would give two or three compartments of alkali, then two or three of water, then water mangle and dry.

The materials used are soda ash, sodium hydroxide, and soap. The final shade can be varied to some extent in the soaping. The more caustic used, the redder the shade, the more soap and soda ash the yellower the shade.

The finishing of the mineral khaki depends upon the fabric and the trade the particular lot is going to serve. If the tent and awning trade, it is not starched; if the clothing trade, it is given a light dressing of starch and softener.

We have now completed the stages through which the fabric being dyed passes. The finishing is usually simple and after finishing there remains only the folding, packing, shipping, and, of course, the question of getting your customer to approve your sample and finally to pay his bill—neither of which are always easy.

How can the shade be varied, what are the characteristics of Mineral Khaki, its uses, and its future are all natural questions and will be considered.

### Varying the Shade

The shade can be varied by the proportion of soap to soda ash to caustic in the washing as already referred to. In addition the more iron used the redder the shade, the more chrome used the bluer the shade, the longer it is aged or steamed the bluer and deeper the shade. I have two samples here, one with a relatively high chromium content, and the other one with, as compared to this, a high iron content. They illustrate the difference caused by varying the proportion of iron and chromium acetates in the liquor. It is also possible to use certain dyestuffs in the chrome-iron solution and if not carried too far this is legitimate. Alizarine Blue or Black can be used, care being taken to select one which does not form a lake with chrome and iron in the presence of acetic acid at ordinary temperature but which does do so in the ager; that is, when the acetic acid is driven off and when the temperature is raised. Other blues of the types of Indian Blue and the Gallamine Blues are also used for this purpose, but probably do not give results as fast as the alizarine color.

We have passed around samples showing variations which can be obtained. The small sample marked "D" which has been distributed to each one was dyed with a mixture containing almost twice as much iron as chrome. The very green sample is almost all chrome, and the other samples are properly marked.

May I call your attention to this sample, which is very dark bluish shade. It was obtained through the assistance of one of the blues above referred to and is much darker than could be obtained by the mineral colors alone. It is not as fast as the straight mineral color, but is of a sufficient fastness.

Copper sulphate is sometimes used to produce a bluer caste, and salts of manganese for the same purpose give very dark shades of very good fastness, but are very difficult to control.

The outstanding characteristic of Mineral Khaki is its fastness. For fastness to exposure to light, to weather and to alkali it is not excelled by any other color. We have had samples exposed to weather for one year which showed no fading. One weakness is its lack of fastness to mineral acids and to some extent to strong organic acids. This can be overcome to some extent by using sodium silicate in the washing, which tends to form silicates of iron and chromium which are more resistant to acid than the oxides. Another weakness is the stiffness. It is but natural that a fabric so loaded up with metallic salts should be stiff and it might be mentioned here that the more caustic used in the soaping the stiffer the goods. The less caustic and more soap, the softer the goods. Mineral dyed cloths are hard to sew. The needle in a high speed sewing machine will literally get red-hot and char the thread so that it breaks. This is overcome to some extent by using more soap in the washing and by lubrication of the needle. One good feature is that goods so treated are more or less mildew resistant and water repellent, and this is advantageous in awnings and tents.

### Use for Uniforms, Awnings, Etc.

Mineral Khaki is used by the U. S. Marine Corp for uniform cloth, it being especially adapted for service in Haiti, Panama, Philippine Islands and similar countries; although the last U. S. Marine Corps contract was dyed with vat colors. Mineral Khaki is considerably cheaper and certainly as serviceable. It is used for tents and for awnings. I have two samples here which were first dyed with Mineral Khaki and then printed with the awning stripes. Incidentally, in the majority of cases, the printing is done with pigment colors, so that it is a true mineral color all the way through. I doubt if that (indicating) is a mineral color; the brown, I think, is. Mineral Khaki is also used for clothing purposes and especially in Texas and Oklahoma. For that section it is peculiarly adapted. The average workingman's clothes down there become saturated with oil and grease and require severe treatment to cleanse. Mineral Khaki will stand this treatment, and in the last few years a tremendous business has developed on clothing fabrics for that section and mostly in special shades of very high chrome content. They are sold under such special names as Mineral Sand, Mineral Pearl, Mineral Putty.

The future of Mineral Khaki is problematical. It will probably be used for many, many years in the awning and tent trade, as it is so well suited for their requirements. But the shades are hard to control and once something goes wrong it is very difficult to correct as it is not stripped except with acids. The investment in machinery is heavy, the process is slow and requires a large amount of floor space. It largely depends on the development of the vat colors. As they come down in price and finally reach a level where the difference in cost is not so great, then will the use of Mineral Khaki for the clothing trade begin to fade out.

### Discussion

*Chairman Grandage*—Mr. Hayes has told me that he will be very glad to answer any questions that you care to ask. He has also added to that the statement that if you are able to stick him he has a man with him, Mr. Baxter, who can answer those questions that he is unable to answer himself.

*Mr. Stewart Carter*—Might I ask Mr. Hayes what is the average increase in weight?

*Mr. Hayes*—I can't answer that, Mr. Carter.

*Mr. Carter*—I suppose it would depend on the mixture that you were using.

*Mr. Hayes*—It would depend on the mixture. It would depend, if you will go back to the gray goods, on whether the gray goods contained any starch or not, and how much. But you mean, I presume, on a fabric that was not starched.

*Mr. Carter*—Yes.

*Mr. Hayes*—I have, really, never taken those figures, but the ash content is undoubtedly very high. In fact, you can take some mineral khakis and ignite them and there will be enough ash there for the cloth to retain its form.

I have seen those figures but I am sorry that they have escaped my memory for the moment.

*Mr. Carter*—In the same way, I did make some records of that but I think they were lost.

Speaking of the troubles you run into, the cloth is stained, and one thing or another, and has to be stripped off. I remember that we had trouble like that. Anyone would think it is easy enough to get those stains off, but we discovered a rather peculiar thing along that line. We took a swatch and put it in the kier and gave it a lime boil, and after that the whole thing soured out with hydrochloric very easily.

*Mr. Hayes*—Were you able, then, to redye the Mineral Khaki all right?

*Mr. Carter*—I don't exactly recall what the future of the goods was. I think they got through with them, but those stains came out very easily indeed by that process.

*Mr. Hayes*—The reason I asked that was that I didn't believe you could successfully kier-boil goods and then dye with Mineral Khaki. My experience, though, has been more or less on the heavy ducks and heavy twills and drills. If it was a light fabric, you could probably kier-boil it.

*Mr. Hirsch*—Have you had any experience with copper salts? Have you dyed these materials with copper salts at all, by the so-called Willisdon process, or any other?

*Mr. Hayes*—You mean with the ammoniacal salts of copper?

*Mr. Hirsch*—Yes.

*Mr. Hayes*—Only in the laboratory. I have done it in a beaker, nowhere else.

*Mr. Hirsch*—Do you know very much about the process? Do you know whether it is being done in a practical way?

*Mr. Hayes*—My experience dates back to around 1918, when I was given samples and told that it was being done in England for war purposes. I haven't touched it since that period. I don't know whether it is being done or not. It has never been done in this country to my knowledge. I think the biggest difficulty is the preparation of the double salt of copper.

*Mr. Bonnett*—Mr. Hayes, don't some of these khakis on the market show different shades on one side as compared with the other? I was asked the question not long ago as to what caused that.

*Mr. Hayes*—Unfortunately, that is so, but I didn't want to mention it. (Laughter.)

It can be caused in two or three ways. It can be caused, for example, if your padding machine consisted of a two-roller machine and if one roller was considerably softer than the other. The chances are that you would get a difference in shade between one side and the other. That is one of the reasons why I would recommend the three-bowl padding machine, and running the goods twice. We run the goods through, batch them up, bring them back around without drying and run them wet.

It could also be done in the soaping, if you had a big difference in the density of the rollers there. I have seen such samples. I have seen it in my own work. But it can be avoided.

*Mr. Hirsch*—How do your costs compare with similar shades dyed with sulphur colors?

Mr. Hayes—I think that a Mineral Khaki, compared with the same shade dyed with a sulphur color, would cost more. There is no question about it. In round figures, Mineral Khaki would probably cost you a cent or a cent and a half more than sulphur colors, and I should think four or five cents less than vat colors. Those are very rough figures.

*Chairman Grandage*—Are there any more questions? Mr. Hayes seems to have been able to answer them all so far. I would like to see him have to call on Mr. Baxter for help at least once. If there are no more questions, we will proceed with our program.

Mr. William Cotton will present for us, "New Developments in Cotton Printing." Mr. Cotton! (Applause.)

## New Developments in Cotton Printing

By William Cotton

Mr. Chairman and Gentlemen: I should like, first of all, to thank you for permitting me to be present at your meeting to-night. During my various travels I have had the pleasure of being present at meetings of textile colorists in many countries of the world but as yet I have never had the honor of being present at a meeting of textile colorists in the United States. Therefore, I look upon it as a special privilege to be able to address you.

When I was asked to address you to-night I was on my way from Europe and I therefore did not have time to write out such a splendid address as Mr. Hayes has delivered, and you will please pardon me if I speak without notes, and if I am not so fluent as he was. When I received your invitation to speak to-night I was feeling

very seasick and certainly did not feel at all inclined to address you. But I have gotten over that now. At the same time, I was a bit diffident as to whether I should be able to tell you or show you anything you did not already know.

I had the pleasure of visiting the United States some fifteen years ago, at which time I went over some of your very large plants, and I came to the conclusion that there was a great deal which you could teach the textile colorists over in Europe, especially as regards saving manual labor and production per machine. I have never seen the same production per machine, except in Russia, before the war. But, gentlemen, for many years I was attached to a Russian print works and I know that it always interested us colorists to see what was being done in other countries and by other firms, although perhaps the styles they were making were not suitable for our local conditions. I hope, therefore, that some of the patterns I show to-night may be of interest to one or two present.

At the present time the textile colorists in Europe are mostly interested in the class of dyes which we call vat colors. I am glad to say that there is a special demand now in Europe for faster colors and that is, of course, quite natural. Before the war we were able to put a loose color on a good piece of cloth; it was made up into a shirt or into a lady's dress; it was worn two or three times and then thrown away. We have gotten so much poorer since the war that we cannot afford that luxury any longer. We find that the shirtings and the ladies' dress goods have to be worn considerably longer than formerly and therefore, naturally, we have to put better colors on the cloths, so that they may keep a good appearance.

At first it was a little difficult to bring the populace to acknowledge that it is cheaper to pay a little more for a good print which wears longer than to buy any old trash on the market. But we have been able to do a great deal in that respect by introducing the so-called Indanthrene houses in Europe. These Indanthrene houses are of interest. They are large shops. All the goods that are dyed and printed and sold in those shops are guaranteed to be dyed and printed with Indanthrene colors, not vat colors in general, but Indanthrene colors. That is the fastest class of vat colors. The goods sold in those shops are marked with an etiquette.

All the goods that enter such a house are first examined to see whether they stand the Indanthrene test and only if they stand the Indanthrene test are they allowed to be sold. Therefore, anybody going into one of those Indanthrene houses knows he is going to get good stuff.

Besides these Indanthrene vat colors, a few other colors can be seen in an Indanthrene house, colors which have the same fastness properties as Indanthrene. I might mention Turkey Red, for example, and Aniline Black, Diphenyl Black, and Sulphur Black in warps, that is, a fancy cloth where the background is dyed with sulphur colors. Everything else is refused in these Indanthrene houses.

The effect of the Indanthrene houses has been that the term "Indanthrene" has become a popular term in Europe. You will find that all the girls and ladies in the towns and villages know what Indanthrene is. They will go into a shop and demand to have the goods dyed or printed with Indanthrene. They insist on seeing the Indanthrene etiquette. If they don't see it, they won't buy the goods. You see what a good thing it has been to instruct the population in general as to what a fast color is.

Of course, at first people thought they could get everything done with Indanthrene colors. I have known of ladies going into a shop and wanting wool material or material made of half wool dyed with Indanthrene colors, and so on, but they soon learned that these Indanthrene colors can only be used, in the first place at any rate, on materials made out of vegetable fibers.

What is being printed with Indanthrene colors in Europe? They are using them for all styles where extreme fastness to washing is required, such as for shirtings. You will not find a shirting in Europe printed with a pigment color, gentlemen. All shirtings are printed with vat colors. Secondly, they are used extensively for ladies' summer dress goods. I don't know how it is here in America but in Europe the ladies won't go about with sunshades any more; sunshades are a thing of the past. Therefore, the demand for fastness on ladies' dress goods is far greater than it used to be. Then, Indanthrenes are used extensively for decoration cloths for outside purposes, but not for customers that are used in inside rooms. In my opinion and in the opinion of most people on the other side, mordant colors and alizarine colors are fast enough for all furniture cloths, to be used in a diffusely lighted room.

I might call attention to the Gobelins which were dyed with vegetable colors and which have stood the light of a room for perhaps a century or more. Mordant colors and alizarine colors are, firstly, far cheaper, and they are easier to print, as every printer knows, and for these purposes they are fast enough.

I have here a few samples, just to show you what is being done with vat colors in direct printing. I will not pass these samples around because I think that rather distracts attention, but I shall be very pleased for anybody who wishes to come up and see them after my address is finished. I will show the samples as well as they can be seen from here.

This is a very fashionable cloth, probably here too—crepe Georgette—printed entirely with vat colors. Mostly we see these rather large patterns now. We are not going in for small patterns in Europe.

For instance, here is a typical print for this spring's fashion of vat colors. You see the rather large pattern, and there are even still larger patterns being used.

I should like to show you something which is selling very well at the present moment, a white ground with an extremely large pattern. All these styles, gentlemen, are being done with vat colors.

Vat colors are not only being used now for direct print-ons but we find that they are also being used considerably for discharge work. Of course, it is not every vat color which can be discharged to a pure white but we have a considerable number of vat colors at our disposal which do give a good white when they are treated by a certain process.

The goods are dyed in vat colors and then padded with about a hundred grams of Leucotrope W concentrated per liter and then printed with an alkaline hydrosulphite discharge. In this way it is possible to get a white on a fast dyed ground.

At the present time if you will go into the shops in Germany you will see, above all things, three shades that are running. You will find a dark violet, mostly in these largely patterns; you will find a dark navy blue; and you will find a brown. These are the three shades that are being discharged at the present moment in large quantities in Europe.

We have now seen that it is possible by using suitable colors to get a good white on them. But, gentlemen, we have gone a step further and we have found that it is possible to use a vat color discharge on a vat colored ground, and even this is being done, which is, of course, the very, very highest class of work that is possible.

A short time ago it was thought impossible to produce a vat color discharge on a vat colored ground because all vat colors are more or less destroyed with hydrosulphite and leucotrope. But we have found that it is possible under certain conditions to get vat color discharges on a vat colored ground, first, by using for dyeing such colors as are easily destroyed, and, secondly, by not using an excessive amount of hydrosulphite and leucotrope.

I have here a whole series of patterns where, you see, the color discharge is vat and the ground it vat. I might perhaps explain the reaction. I don't know whether I am right, but this is my personal opinion: When you have two vat colors, one in a ground and one in the printing paste and you haven't an excessive amount of hydrosulphite and leucotrope, that hydrosulphite and leucotrope will first attack the color which is in the finest subdivision. The dyed vat color in the ground is, of course, in a considerable finer subdivision than the vat color in the printing paste. On the other hand, too, the thickening in your printing paste protects that color to a certain extent.

Of course, that is only my private hypothesis. Whether it is correct or not, I do not know.

A very beautiful style is being done, furthermore, in Europe with vat color discharges on Indigo. You all know that originally the chromate discharge style was used largely and for color discharges we had to put on lakes. Then came the chlorate discharge. We were able to use certain azo colors in connection with the chlorate discharge. And now what they are doing extensively is to print vat colors on Indigo.

Here is a lovely bit of cloth. These are all vat colors on Indigo. This is a process which was first worked out by my friend, Dr. Haller (I don't know if any of you know him), at the works of Enderlin in Austria. He has left Austria now and is manager of Gebr. Jentsch in Saxony and has taken this process over there and is working it very satisfactorily.

The principle of the process is as follows: the vat colors are printed here with hydrosulphite, with the addition of copperas and tin crystals. Then the goods are aged. The Indigo is reduced in the ager and after that the goods are passed through hot caustic soda of 20 deg. Be.

You remember, all of you, that there was a process of printing vat colors according to Jeanmaire. He was the first man who printed Indanthrenes by printing these colors with copperas and tin crystals and passing through caustic soda. Dr. Haller has taken this process of Jeanmaire and combined it with the hydrosulphite process, and in this way he is able to destroy his Indigo and fix his vat colors.

There is, of course, a certain amount of difficulty in connection with this process. It is not very pleasant to pass goods through caustic soda of 20 deg. Be. at about 80 deg. Cent., and the Indigo is a little bit dulled through this alkaline process, but the effects are very beautiful.

The red in this pattern is not a vat color. All the other colors are vat. The red is para-nitro-ortho-anisidine.

Gentlemen, we have now discussed the question of printing vat colors direct on. We have discussed the question of using them as color discharges on vat colors. I should like to mention one other thing for which they are being used now to a certain extent, and I think they are going to be used more and more for that purpose; that is as color discharges or color resists under Aniline Black. It is really a shame when one thinks of the loose resists that have been printed up to now on Aniline Blacks. How often has a basic color been printed on Aniline Black simply with zinc oxide, and after the dress has been made up and has been worn a few times and washed a few times, the result is that the color discharge disappears and you only see a dirty gray on a black ground! It is therefore essential to use a better class of

colors in Aniline Black resist styles and now vat colors are being used for that purpose.

Of course, gentlemen, it is not possible to get quite the same bright effects with vat colors as one can get with basic colors. That you can expect; but you do get a certain fastness which you cannot excel in any other way. I have seen some very beautiful work, especially in Poland, along this line.

This is a small collection of this style which I received from Poland, done at the well-known works of Poznanski. They are as good as anything you can expect to find. There is one difficulty in connection with the process, though, gentlemen, and that is that the vat colors are likely to form halos on an Aniline Black ground; and that, of course, can be easily understood. A vat color requires a moist steam for its fixation. You have to print a vat color on with an alkali, with a caustic or caustic potash or soda, and all those things are very injurious to Aniline Black. They spread in the steam and very easily form a halo.

The way the works are trying to get over it—I will not say that they have gotten over it perfectly, but they are trying to get over the difficulty in Europe—is, first of all, by not using steam which is very moist, and, secondly, by printing the vat colors in this style with carbonate of soda. Carbonate of soda is certainly not nearly as hygroscopic as carbonate of potash or caustic soda, and is therefore not so likely to form halos as the other alkali salts.

This is a very nice bit, also from a German works. You see, the effect is not at all bad. You can get quite fine resists on Aniline Black with vat colors.

### The Indigosols

Now, gentlemen, I should like to say a few words on another class of colors which more or less resemble the vat colors, a special class of vat colors which were put on the market a short time ago and which are interesting the textile colorists to a very great extent. I refer to the so-called Indigosols. I dare say you all know what an Indigosol is. An Indigosol is a stable Indigo white compound which is soluble in water. It is really something which we have been looking for for years: a stable Indigo white compound. The problem has now been solved since the Indigosols have been put on the market.

What can we do with these Indigosols? Well, to a small extent the Indigosols are used for direct printons, for such styles of work as the vat colors are perhaps not quite so suitable for. In order to show you what I mean, I have brought here what I think you will all grant me is a very fine print, done by an Alsatian works. It is a decoration cloth. You see, it is an imitation perhaps of a Gobelin. It is one of the finest bits of engraving I have ever seen. It would be quite impossible to print this bit as well with Indigo, as Indigosol is a water color and therefore gives a far sharper print.

For machine printing perhaps the Indigosols haven't so very much interest, but I should like to call your attention to some printing where the Indigosols have been used considerably. That is in block printing. I don't know if any of the gentlemen present do much block printing with vat colors. It is not so easy to do it, as it is very often impossible to age the goods you have printed on the same day they have been printed. What you print on your machine you can put through your ager, but sometimes it takes a block printer two or three days to finish a complicated design, and if you have your vat colors printed on the cloth in your print shop in a rather moist atmosphere you will find the hydrosulphite on the cloth you have printed destroyed, so that when you go to age your block-printed cloth the colors won't develop. That has often been found to be the case; and although the printers on the other side have tried to get over that difficulty by spraying hydrosulphite over the print the next day, or just before aging, still the results have not been very satisfactory.

With the Indigosols you have no difficulty. You can print your cloth; you can let your cloth lie for days, and age it up, and it will come out just as well as if it were aged the same day as printed.

I have here also a very interesting 'kerchief which I brought with me from Holland. You see, this is red, blue and yellow. Here you see a very pretty combination of Rapid Fast Red GL with Indigosol, and the yellow is afterward printed over with Chrysophenine.

### Various Designs Obtained with Indigosols

This is also a very interesting bit I got in Holland, printed with Indigosol. It will interest anybody who has done batiks or imitation batiks. This was done in the following way: A white resist was printed on and an aluminum mordant. After this the goods were padded in Indigosol. Therefore they are reversible. When you first look at this bit you might think it was done on a Duplex machine. It is white resist, aluminum mordant, padded in Indigosol, fixed, dyed up in Alizarine Orange—a beautiful bit of work.

I should like to show you another thing for which Indigosol can be used. I suppose you all know this old style. This old style used to be done by printing precipitated sulphur on a glucose-prepared cloth and giving the whole thing an Indigo cover. It wasn't a nice thing to print precipitated sulphur. It always

stuck in your engravings. It was a very nasty color to print. This style is far better produced with Indigosol. You print on thiosulphate for the white and Indigosol, and give it an Indigosol cover, age and you have this result. And if, instead of your white, you use a vat color, you can get a very pretty colored resist under Indigosol. Here we have a Helindone Pink, a vat color printed under an Indigosol cover. This is Orange, printed the same way, and this is a Lavender.

Another very pretty style one can do with Indigosol is the red-white style, done with para-nitro-ortho-anisidine. First of all, the cloth is padded in Indigosol. Then the nitrosamine of para-nitro-ortho-anisidine is printed on with acetate of soda, steamed, washed and soaped.

This blue-red style can be excellently done with Indigosol.

This is another pattern of Indigosol It is a three or four color pattern resisted with vat colors.

Gentlemen, it is as easy to do this style as it is to do Aniline Blacks. The cloth is padded in Indigosol, then the vat colors are printed on, aged, washed and soaped. The difficulty in connection with this style is the same as that which I mentioned in connection with vat colors on Aniline Black: the formation of halos, which sometimes are very difficult to overcome.

I forgot to mention that the best way of overcoming these halos is by using a gum roller in the last place on the machine. You first print your vat colors and then give them a squeeze with the gum roller to finish up. The gum roller presses the color into the cloth, takes away the excess, and more or less prevents the formation of halos.

I should like to mention one other style which is being done at the present time in Czecho-Slovakia with Indigosol. If you look at it, it doesn't look at all like Indigosol. You see here a beautiful brown with red, yellow, blue and green discharge work. Gentlemen, that is Para Red, topped with Indigosol; then where we have the red thio-sulphate is printed on. The thio-sulphate resists the Indigosol without discharging the Para Red. In the other cases they are vat colors printed with hydrosulphite. The vat colors, therefore, discharge the Indigosol and the Para Red; the thio-sulphate only discharges the Indigosol, and leaves the Para Red ground. It is the same style which was formerly, as you know, done with Aniline Blacks and was first introduced into the trade by Herr Schmidt in Mulhausen.

The patterns I have shown you up to the present moment of Indigosol have all been done with a so-called Indigosol O, that is, the Indigosol made out of Indigo. But, gentlemen, it is possible not only to make Indigosol out of Indigo; it is possible to make Indigosol out of various other vat colors. The first other vat color which we tried to turn into Indigosol was the well-known Indigo MLB4B, the Tetrabrome Indigo. That gives a much brighter shade than Indigosol O and is therefore very suitable for producing this beautiful style which is also used to a great extent in Bohemia.

Here you see Indigosol O4B combined with the Nitrosamine of para-nitro-ortho-anisidine. This style used to be done practically exclusively with chloride of zinc resists under Indanthrene Blue, but anyone who has attempted to do red resists with chloride of zinc under Indanthrene Blue RS, knows what a difficult thing it is. I only know of three works in Europe which are doing it well.

With Indigosol O4B, it is possible for every firm who has an Aniline Black ager to do this style as well as Aniline Blacks, and it is as easy to do as Aniline Blacks. The goods are prepared in Indigosol O4B, the nitrosamine of para-nitro-ortho-anisidine printed on, aged and washed.

We hope in time to have a complete range of Indigosols. At the present moment, besides the Indigosol O and O4B there is already on the market in Germany a yellow (this gives a golden yellow tinge) which we call Indigosol Yellow HGC. We have put an orange on the market, Indigosol Orange HR. We have a pink on the market, Indigosol Pink HR. We have a violet on the market. We have two other blues on the market, and we have a black on the market. So that we have a complete range from yellow to black and it is therefore possible to combine these Indigosols according to one's wishes.

There is one other thing for which the Indigosols are being used, but I shall mention that a little bit later. I should like first to say a few words on the so-called rapid fast colors.

### The Rapid Fast Colors

Gentlemen, these rapid fast colors are being used more and more over the water. People are getting more and more to have the opinion that these colors are very suitable for certain local conditions. Formerly, a print of this description was done entirely with Alizarine Reds. Instead of that, this is all being done now with Rapid Fast Reds, due to the fact that it requires only a short ager and a passing through an acid bath for the full development of this color. No more cottage steaming; no more steam work. This is Rapid Fast Red printed with Black.

In connection with these rapid fast colors, we have a range now of Orange, Red, Bordeaux and Blue. But there has been a difficulty in producing the other colors with rapid fast colors. I cannot produce a green with rapid fast colors. I cannot produce a brown with rapid fast colors. We have now found that it is very easily

possible to combine rapid fast colors with Indigosols. They work splendidly together. You can mix them in the same color. They require exactly the same aging, the same passing through acid, and by combining the Indigosols with a rapid fast color we can produce every shade that is required for printing. We can produce greens—this is a beautiful bit of velvet printed in this way. We can print furniture cloths—blues, browns. The whole series of patterns can be combined by printing Indigosols with rapid fast colors.

Of course, this class of work is not as good as vat colors. A vat color will always be faster than a combination of a rapid fast color and an Indigosol, but this process is considerably faster than anything you can do in the basic line, and you can compare it more nearly to mordant colors. It has the advantage over mordant colors of requiring only a rapid fast ager and a passage in an acid bath, whereas the mordant colors to a great extent have to have an hour's steaming.

### The Naphthols

As we have just touched on these rapid fast colors, I should like to mention that considerable interest has been created in the circles of textile colorists in Europe by the introduction of the new naphthols. You all know how very extensive the dyeing of naphthols has become in all the various countries, but we have experienced a little difficulty in the discharging of naphthols in printing. The only naphthol on the market until recently which was easily discharged to pure white was the BS and I am sorry to say that the BS hasn't anything like the fastness to light which the other naphthols have.

A few months ago we put on the market two new naphthols, Naphthol AS-D and Naphthol AS-TR, and these naphthols have the property of being very easily dischargeable. You can get a perfect white with these naphthols, and therefore they are also good not only for whites but for colored discharges. One combination, Naphthol AS-TR with a Fast Red TR base, is especially interesting to all printers, because it is an exact imitation of Alizarine Red-Blue shade.

You remember, when para-nitraniline was first introduced nobody wanted to use it because of having become accustomed to Turkey Red discharge work with alizarine and the para-nitraniline was too yellow. We tried to use soaps, and all sorts of things were introduced in the para-nitraniline bath in order to make the shade bluer; and, of course, afterward the people were satisfied with the results and para-nitraniline has become a very great thing. However, there are still certain firms in Europe which are turning out Turkey Red styles because of the shade, a shade which was not to be approached with para-nitraniline; and, of course, Para Red was not sufficiently fast. These firms have been greatly interested in this Naphthol AS-TR combination, because with this naphthol combination they get the absolute shade they want with alizarine and they get something which is far faster than para-nitraniline. I will certainly not maintain that these naphthols are destined to take the place of Para Red. That is out of the question. Para Red is so cheap that it will always remain the stable article; but I think these naphthols will take the place of the Turkey Red, which is still being discharged, and for the better class of goods where higher prices can be demanded and can be obtained.

### Katanol in Discharge Work

I should like to call your attention to one more thing. You are probably doing here what is being done in Europe: color discharges on direct colors with basic colors. Gentlemen, this style of work is being done in Europe exclusively with Katanol O, and for the following reason: It is a very nasty proposition to print a basic color with hydrosulphite and tannin. It always forms a lake, and on printing you get streaks and you smear your rollers. By using Katanol you are not required to put in any tannin into your printing paste. The goods (these are direct dyed goods) are padded in Katanol, or the Katanol can be put into the last wash water. Then the basic colors are printed on with hydrosulphite, without any tannin, and after that they are aged and washed. The advantage, therefore, is better printing colors, and, curiously enough, less hydrosulphite can be used. I think the reason for that is that the printed colors, not having any lake formation, penetrate the cloth and therefore discharge easier than if in the printed color there is a lake formation with tannin.

Katanol, though, is not only being used for fixing basic colors on direct colors. It is also being used for fixing basic colors on Aniline Black. I mentioned before that vat colors are being used on Aniline Blacks, but not exclusively. There are only a few firms that are doing Aniline Blacks with vat colors. The chief work along that line is still done with basic colors.

Formerly these basic colors, as you all know, were fixed on with zinc oxide. Therefore, we had on the Aniline Black a zinc ferrocyanide salt of the basic colors. This style is being done now exclusively with Katanol. The goods are first prepared in Katanol; then they are padded in Aniline Black; then the basic colors are printed on, aged and finished. And, of course, these basic colors fixed with Katanol are infinitely faster than those that used to be printed with oxide of zinc. In fact, they are as fast as a basic color printed on a white ground with tannin.

Mordant colors, chrome colors, are chiefly being used in Europe for furniture cloths and bedspreads. This style of work is entirely done with chrome colors, mordant colors. These are typically English quilts.

We have been speaking about cotton up to this time. I should like now to say a few words, if you will allow me to, on artificial silk printing and perhaps a few words on wool printing.

### Artificial Silk Printing

Artificial silk printing is coming very much to the fore in Europe; but I am rather chary about mentioning it in your presence, because I know that as regards silk printing and half-silk printing you are far ahead of us. The goods you turn out in your Paterson district are certainly much finer than anything we can turn out, with the exception, perhaps, of Lyons and Basle.

The goods in the artificial silk line that are being printed over the water might interest the gentlemen here who do the same style of work. First of all, there is a so-called crepe made of viscose and cotton. Then, there is a very pretty cloth in which the viscose is on the surface and the cotton at the back. Then, there is a material which is just the opposite, with the cotton on the surface. These are really the three kinds of cloth which are being extensively used in Europe.

The printers are also very much interested in acetate silk. I don't know of anybody who is printing acetate silk alone, but acetate-silk effects are being used extensively and I am quite sure that you do this just as well as we do, if not better.

This is a certain style which is being done extensively in Europe—cotton and acetate silk interwoven, then dyed with a direct cotton color, which leaves the acetate silk white, and then the whole thing is discharged with basic colors. It gives the impression of a shot effect, and a basic color discharge on the top.

This is a similar pattern. The acetate silk is white, the cotton is brown, and the whole thing is discharged with basic color.

Other very pretty effects being done with acetate silks are obtained in the following way: The acetate silk is dyed yellow, the viscose is dyed pink, and the whole thing is then discharged, with blue in this instance.

Here is a case of the acetate silk dyed black, the viscose brown, and then the whole thing discharged with blue.

A style which, so far as I know, is not being done so very much here but which is done a great deal in Europe is muslin delaines. Everybody in Europe has been wearing muslin delaines and the printers have had considerable difficulties with their muslin delaines in two instances—first of all, in tendering, chiefly in block work. That is very natural. You must be very careful when you are discharging muslin delaines. Hydrosulphite is slightly alkaline, and you know what effect alkali has on wool.

The only way to overcome that difficulty that I know of is to treat the goods with moist steam and to put into the printing colors such substances which will form acid or acid salts on steaming, such as ethyl tartaric acid, acetin, and so on. With the help of these things it is possible to overcome the tendering of the wool.

The other great difficulty the printers have been experiencing with muslin delaines is that their color discharges have not been fast to rubbing. There has been a great deal of trouble about that, but even that has been overcome. Formerly, these color discharges on muslin delaine were entirely done with basic colors. You know that basic colors and wool don't agree very well. They are like a cat and a dog. However, it has been possible to make these muslin delaines absolutely fast to rubbing, and it has been a great style.

I would like also to show this border style, these very pretty discharge effects on muslin delaines. These are all fast to rubbing and are very beautiful effects.

I would rather not say much about silk printing, gentlemen. You in Paterson probably know far more about that than I, so I would rather not touch on that subject. We do very little silk printing, and I do not think, so far as Europe is concerned, that there is much novelty being done in that style.

Gentlemen, I will close my remarks by thanking you very much for your kind attention. (Applause.)

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*Chairman Grandage*—Gentlemen, I am sure we are very deeply indebted to Mr. Cotton and Mr. Hayes for their most excellent addresses. Mr. Cotton, I believe, will be very glad to answer any questions that you want to ask him. I excuse Mr. Wood in this particular case. (Laughter.)

*Mr. Metz*—Mr. Cotton, you mentioned something to me the other day about dyeing under pressure. I wish you would say a word about that to-night.

*Mr. Cotton*—The question Mr. Metz has just asked has nothing to do with calico printing, but it may interest some of the gentlemen present. As I say, I am more or less a specialist in printing, but here I touch on another subject, in which some of you may be interested.

There has been great difficulty experienced in Europe in getting good penetration with vat colors.

The Indanthrene houses that I mentioned before guarantee that all the goods they sell are dyed with Indanthrene colors and they not only sell in these Indanthrene houses cloths, but they sell ready-made things as well, such as ready-made shirts, pajamas and that sort of thing, especially pajamas. The buttonholes, and so forth, of those garments are all done with Pearl yarn. Originally these Pearl yarn things were not dyed with vat colors but, of course, the Indanthrene houses said they wouldn't accept them so they had to be done with vat colors, and the dyers had the greatest difficulty in getting the vat colors to penetrate this yarn.

There has also been great difficulty experienced in thick cloths like rips. It has been practically impossible to get good penetration in those cloths.

### Dyeing Under Pressure

We worked on this subject a good deal and a friend of mine hit upon the idea that perhaps it would be possible to dye these vat colors on the yarn and on these piece goods under pressure. He wanted to press the vat through and through, and the idea is fairly simple.

He works under the pressure of a neutral gas. Of course, in dyeing a vat color you can't work under pressure of air but there is nothing to prevent you from working under the pressure of nitrogen. So he has fixed up a nitrogen bomb, say, to an ordinary dyeing apparatus, and he pumps the vat liquor through and through the yarn and through the piece goods under the pressure of nitrogen. He has a patent on that device. The patent has been handed over to the Zittau Maschinenfabrik, who may have a branch in this city, and if anyone is interested they can apply to them and I am sure they will give you all the particulars you want about the process and the machine.

We are only interested indirectly, because we are very pleased that it is possible for people now to dye vat colors on cloths through and through.

### Discussion

*Chairman Grandage*—Gentlemen, aren't there any questions? Has our speaker anticipated them all?

*Mr. Hayes*—I would like to ask Mr. Cotton, with regard to the Indigo dyed with the vat print, how fast that Indigo is.

*Mr. Cotton*—You mean these pieces that I showed you, Indigo with vat?

*Mr. Hayes*—Yes.

*Mr. Cotton*—Well, the Indigo has the fastness of ordinary dipped Indigo. That is to say, this cloth is first dyed quite normally on an Indigo vat. Then it is printed with the vat colors, aged, then passed through concentrated caustic soda. In this passage through the contrated hot caustic soda, the Indigo becomes a little dull, but at the same time it becomes a little faster to rubbing. But the whole goods, of course, are not faster than ordinary Indigo prints.

*Mr. Stott*—In dyeing with Indigosol colors and then discharging or overprinting with a discharge print, does the Indigosol color come up after the steaming? Suppose, for instance, you are printing a vat over an Indigosol which has been padded. Does the Indigosol color develop with the discharge of the vat color?

*Mr. Cotton*—Gentlemen, I should like to mention now, since the gentleman has spoken of it, that there are two ways of applying Indigosol. There is a so-called steaming process and a so-called acid process. In the acid process the Indigosol is padded with nitrite of soda and developed in sulphuric acid without any steaming at all. This is the process which was first recommended, but I find that the printers in Germany and other countries across the water are not very anxious to use this process, because when this Indigosol with nitrite of soda passes through sulphuric acid, nitrous fumes are formed, and unless they have very good ventilation in their dyehouses these nitrous fumes are apt to have an injurious effect on the workmen.

The second process, which is being used extensively, is to use Indigosol exactly like Aniline Black. Therefore, you make a padding color of Indigosol with chlorate and you pad your goods. After padding your goods, the goods have a slightly yellow tint. The Indigosol is not developed. Then they are taken to the printing machine and the vat colors are printed on. They are then taken to the ager and aged. The Indigosol, on coming out of the ager, is a dirty gray. Therefore, it is to a certain extent oxidized; but the final development of the Indigosol takes place in the washing process after the aging.

*Mr. Stott*—In other words, then, the vat color discharge is developed at the same time as the Indigosol color?

*Mr. Cotton*—Yes.

*Mr. Metz*—Might I ask Mr. Cotton another question? When I was over in Europe a few years ago I brought back a sample of some Philana goods. Can you tell us anything about their process; how far it has gone, and whether it is really successful? We would all be more or less interested in that.

*Mr. Cotton*—I can give you particulars about the Philana process.

The Philana process was a patent of Mr. Schwartz, who was formerly manager of the well-known Zuendel Works in Moscow. Mr. Schwartz has made many discoveries in textile coloring. I might mention the fact that the first work on rongalite was done by Mr. Schwartz, Dr. Baumann, Dr. Thesmar and Dr. Froissard at Zuendel's.

Mr. Schwartz found, shortly after the war, that if one treated cotton goods with concentrated nitric acid of a fairly high concentration (I think it was 72 per cent, although I am not sure about that figure) the cotton goods acquired a wool "feel," a wool handle. If he went higher than that he got nitrocellulose formed. If he went lower he didn't get the proper feel. But under certain conditions, with a certain percentage of nitric acid and at a certain temperature, he found he could get the cotton to give a nice warm, woolly feel.

This process was put on the market and extensively interested a great many gentlemen in Europe, but I am sorry to say that the process has been given up to a great extent for the following reason: Nitric acid is a very expensive acid to use. The result was that the cost of making Philana goods was very heavy. The company that was formed, which held the patents and did all the processing, demanded about 20 pfennigs (that is, 5 cents) per meter for this Philana finish. And, gentlemen, at the end it wasn't wool. It was cotton, just as it was before. I mean to say, if you took a bit of Philana goods and squashed it, like that, it remained in folds, whereas wool is elastic; wool does not remain in folds. Therefore, it was practically nothing but a cotton which had a woolly feel.

They soon found out that nobody was willing to pay 5 or 6 cents per yard more in order simply to get this wool feel, and the result is the Philana has been practically withdrawn from the market.

*Mr. Stott*—I would like to ask one more question, to revert to Indigosol again. Do you know if the use of vanadium chloride is of any great value as an aid to the development of the color?

*Mr. Cotton*—I should always use a vanadium salt in combination with Indigosol. I do not think there is very much difference between using ammonium vanadate or vanadium chloride. Potassium ferro-cyanide or ferricyanide, which are used in Aniline Blacks, are certainly not suitable because they give precipitates.

*Mr. Stott*—You couldn't use a thing like potassium permanganate, could you?

*Mr. Cotton*—I doubt it. I know extensive trials have been made to use all sorts of oxidiation processes. The general opinion is that the best combination at present is a chlorate as an oxidizing agent and a vanadium salt as an oxygen carrier.

*Mr. Northrupp*—Are there two ways of printing these by direct printing, these Indigosols?

*Mr. Cotton*—Yes, I think I mentioned the two ways. You can either print Indigosols with nitrites and then pass through sulphuric acid, or you can print them with chlorate and vanadium salts, and steam.

*Mr. Northrupp*—In the first case, are the goods steamed?

*Mr. Cotton*—No. In the first place, the goods are padded with Indigosol and sodium nitrite, dried, and then run through sulphuric acid without steaming.

*Mr. Northrupp*—How about the fastness?

*Mr. Cotton*—Gentlemen, that is also an interesting point.

Theoretically, in my opinion, Indigosol after it has been oxidized on the fiber should be Indigo. Therefore, the ready-made print or the dyeing should have all the properties of Indigo. Indigosol is a little faster to rubbing than Indigo, but that is natural, because Indigosol penetrates the fiber.

You all know that if you dye Indigo, especially on a fairly thick cloth, and you tear the cloth, you can see the white thread. In fact, in Africa the Negroes, when they get this material, tear it and if they see a white thread they know it is Indigo, and if they don't see the white thread, they won't take the material. A funny thing happened in that connection. A firm which dyes Indigosol sent some to Africa, thinking they had done something very smart. The Africans sent it back, however, saying it wasn't Indigo, because it was dyed through.

The fastness of rubbing to Indigosol is better than with Indigo. The fastness to light and chlorine is a little different. Indigosol that is printed with chlorate and steamed has exactly the same fastness properties as Indigo. The Indigosol which is padded with nitrite and passed through sulphuric acid is not quite as fast to light. Why, I don't know. Perhaps the oxidation doesn't go quite so far, or maybe it goes further. I don't know.

*Mr. Northrupp*—Fastness to soaping is what I have reference to on direct prints by the two methods. What is the difference in fastness to soaping?

*Mr. Cotton*—Fastness to soaping of Indigosol on the whole is better than Indigo, owing there again to the penetration. With Indigo, especially on a dark print, the Indigo remains on the surface and if you give it a soaping that Indigo on the surface is soaped off. Indigosol on the whole is faster to soap.

*Mr. Northrupp*—I mean the two different methods of printing the Indigosols?

*Mr. Cotton*—I don't think there is any difference in fastness to soaping between the Indigosols dyed by those two methods.

*Mr. Northrupp*—There is no steaming required at all?

*Mr. Cotton*—No.

*Chairman Grandage*—Are there any further questions? If not, a motion is in order for a vote of thanks to the speakers of the evening.

. . . A rising vote of thanks was extended to Mr. Hayes and Mr. Cotton. . . . (Applause.)

. . . In the course of the meeting it was voted upon

motion regularly made and seconded, that the New York Section call upon the parent body for the sum of $100. Dr. Pickrell, Mr. Schaumann and Mr. Hadley were appointed to a Nominating Committee to report at the next meeting of the Section.

## ANNUAL SUMMER OUTING OF NORTHERN NEW ENGLAND SECTION

The Northern New England Section will hold its fourth annual outing on Friday, June 11, 1926, at the Merrimac Valley Country Club, Methuen, Mass. Golf, tennis, baseball and several other sports will be the feature activities during the afternoon. An excellent dinner has been planned for the evening, at which time prizes and trophies will be awarded to winners of the various contests. It is hoped that every member will arrange to be present, and that each will endeavor to bring with him as many guests as he desires. Full notices will be mailed at a later date.

## Applicants for Membership

*Active Membership*

Borho, Ernest R., chief chemist, Bellman Brook Bleachery, Fairview, N. J. Sponsors: W. E. Mitchell and R. Gitzgibbon.

Garnet, Gilbert, dyer, Swansea Print Works, Swansea, Mass. Sponsors: Stanley Garnet and L. A. Olney.

King, Theodore C., superintendent of dyeing, bleaching and finishing, Cramerton Mills, Inc., Cramerton, N. C. Sponsors: D. S. Moss and E. H. Killheffer.

Laughlin, Edwin T., manager, bleaching and finishing, Laughlin Textile Mills, Inc., Waterford, N. Y. Sponsors: F. M. Bonnett and H. J. Stulz.

Macormac, Alfred R., textile chemist, Adams Manufacturing Company, Shelton, Conn. Sponsors: C. Nelson Alderman and Jas. Worton.

Millikan, L. E., dyer, Aycock Hosiery Mills, South Pittsburgh, Tenn. Sponsors: H. A. Rodgers and Ben R. Dabbs.

Nuckkolls, Tom J., dyer, Piedmont Plush Mills, Greenville, S. C. Sponsors: B. L. Phetteplace and Chas. H. Stone.

Rothe, Chas. A., boss dyer, Watkins Hosiery Mills, Chattanooga, Tenn. Sponsors: H. A. Rodgers and Ben R. Dabbs.

Skinner, Rowland H., color chemist, Nyanza Color & Chemical Company, New York, N. Y.

Wheeler, R. S., superintendent, Crystal Springs Bleachery Company, Chickamauga, Ga. Sponsors: Ben R. Dabbs and T. R. Smith.

Yates, Thos. Arthur, vice-president, Bates Bleachery Company, Flintstone, Ga. Sponsors: Geo. E. Frick and Ben R. Dabbs.

*Junior Membership*

Armstrong, Jas. F., assistant dyer, Aycock Hosiery Mills, South Pittsburgh, Tenn. Sponsors: H. A. Rodgers and Ben R. Dabbs.

Jennings, Everett C., student, New Bedford Textile School, New Bedford, Mass. Sponsor: F. E. Busby.

McNab, H. E., dyer, Washington Hosiery Mills, Nashville, Tenn. Sponsors: W. S. McNab and Irwin E. Oestereich.

## Changes of Address

Boyd, L. M., 901 N. Main Street, Salisbury, N. C.

Burke, Henry Barker, 39 Burncoat Street, Worcester, Mass.

Fernald, B. B., 137 Laurel Avenue, Providence, R. I.

Genssler, O. H., care of Sandoz, 708 Washington Street, New York City.

Graves, A. N., Central Franklin Process Company, Box 546, Chattanooga, Tenn.

Helliwell, H. J., Room 450, 1013 W. Lehigh Avenue, Philadelphia, Pa.

Hennessey, John H., P. O. Box 79, Charlotte, N. C.

Knoll, Geo. L., 900 N. Shamokin Street, Shamokin, Pa.

Le Portier, V. D., care of Maginnis Cotton Mills, New Orleans, La.

Mason, Philip, 9 Linden Street, Melrose Highlands, Mass.

Selya, Hyman P., 6 Fuller Street, Brookline, Mass.

Warshaw, F. F., 76 Acryigg Avenue, Passaic, N. J.

Washburn, George R., 3255 N. Fifteenth Street, Philadelphia, Pa.

Whattam, T. W., 22 Bloomfield Avenue, Passaic, N. J.

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PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

Published biweekly by
HOWES PUBLISHING CO., INC.
90 William Street, New York City

A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00

Vol. XV May 17, 1926 No. 8

## THE RESPONSIBILITY OF THE DYER IN RAYON BUYING

AN important series of studies in rayon technology is being undertaken by the Textile Division of the United States Bureau of Standards, as the result of a conference of representatives of the rayon manufacturers, representatives of textile manufacturers and officials of the Bureau. Various problems concerning the chemical and physical properties and reactions of rayon were discussed; effects of moisture, light and washing, moisture regain, uniformity and stability of the fiber were enumerated as subjects requiring investigation, and a research program was worked out.

As these rapid strides are made in the technical study of rayon, the necessity for educating rayon consumers becomes ever more urgent. Although fully recognized in some quarters of the textile industry, this need is being passively ignored in others. Strangely enough, the vital importance of this investigational and educational work on rayon is least appreciated by one group in the textile industry which, more than any other, needs such information and instruction. To members of this group the terms "moisture regain," "stability" and "dyeing properties" have little or no significance. This group is composed of those in the mills who purchase rayon merely as *rayon*, with never a thought of consulting the mill chemist and with no more scientific reason for their choice of this or that brand than its attractive feel and luster—or its attractive price.

The valuable technical data on rayon which will undoubtedly be established by the research work of the Bureau of Standards will eventually come to the attention of mill chemists and dyers. As human repositories of such technical knowledge they represent—or *should* represent—a kind of mill oracle, to whom the management may turn when questions of a chemical nature present themselves. In the purchase of chemical products, such as soap, sizing materials and dyes, the chemist should be, and in most cases is, consulted, purely in the interests of mill efficiency. Does it not follow, therefore, that in the purchase of rayon the same technical approval should be sought?

Beyond a doubt, it is greatly to the interests of both the rayon and the textile industries to secure the co-operation of such a research body as the Bureau of Standards in solving rayon technical problems and the co-operation of department stores in educating the general public regarding the merits of rayon; but does it not seem to be of far greater importance that some attention be given to the education of mill purchasing departments, in order that rayon be purchased by the mill on the basis of its technical qualities, only after consultation with the mill laboratory?

In any educational campaign designed to instruct mills in the buying of rayon, moreover, the question would evidently concern the *dyer* more than any other person in the mill; for upon the dyer's head falls the penalty for buying rayon unsuited to the mill's requirements. In the dyehouse the error is revealed in costly processing troubles; and in the dyehouse, therefore, largely rests the great responsibility of purchasing that particular kind of rayon which experience and study have shown to be best for each purpose. The mill chemist who knowingly evades this responsibility is not only adding to the operating costs of the mill but is heaping coals of fire upon his own head. If his mill neglects to consult him when rayon is ordered, he must point out to the management that this neglect results in expensive processing troubles in the dyehouse, that it is to their own interests to consult the mill laboratory when rayon is bought; and if they remain unconvinced he should even demand that his experience and knowledge of chemistry be called upon.

## THE INDISPENSABLE CHEMIST

SO-CALLED "words of wisdom" cannot be applied with equal truth to all cases, any more than so-called "universal panaceas" can cure all ailments. An interesting and also pertinent illustration of this was suggested by an extract from a recent address by Dr. William Blum before the American Institute of Chemists, on the occasion of his acceptance of the Institute's medal. "The best chemist, like the best physician," said Dr. Blum, "is the one who teaches his client how to dispense with his services, and such a one will never lack for other clients." While this maxim may possibly be applicable to certain classes of chemists—whom Dr. Blum doubtless had in mind—it certainly runs contrary to fact in the case of the industrial chemist; or, to take an example close to us, the textile chemist.

Though we allow our imaginations to soar far into the dimness of the future, we cannot for an instant conceive of the textile industry ever reaching such a Utopian stage in its progress that it can permanently dispense with the services of the chemist. Nor, in the

light of this truth, should any individual mill ever be able to say that it has learned from its chemist how to get along without him. The mill chemist exercises a decidedly different function in the scheme of things than that of dyehouse "physician." His work has become just as necessary to an uninterrupted output of perfect textiles as the work of the loom operator. Silk and cotton were successfully spun and woven ages before the power loom was invented, and long before mills had laboratories, but in the economic system of to-day both are obviously indispensable.

## NEWPORT CHEMICAL WORKS, INC.

For the information of the trade interested in the condition of the Newport Chemical Works, Inc., there is shown in condensed form below the consolidated statement as of December 31, 1925 of the Newport Company, of which the Newport Chemical Works. Inc., is a subsidiary.

THE NEWPORT COMPANY AND SUBSIDIARIES

CONDENSED CONSOLIDATED BALANCE SHEET AS OF DECEMBER 31, 1925

*Assets*

| | |
|---|---|
| Capital Assets | $8,884,561.75 |
| Investments | 1,124,603.78 |
| Sinking Fund Assets | 35,853.75 |
| Currents Assets | 3,460,946.59 |
| Deferred Charges and Sundry Assets | 133,692.93 |
| | $13,639,658.80 |

*Liabilities*

| | |
|---|---|
| Capital Stock | $3,571,698.00 |
| Funded Debt | 2,580,500.00 |
| Current Liabilities | 1,115,816.83 |
| Reserves | 4,194,083.79 |
| Surplus | 2,177,560.18 |
| | $13,639,658.80 |

From the above it will be noted that current assets are practically three times current liabilities and that of the total liabilities of $13,639,658.80, $9,943,341.97 is represented by capital stock, surplus and reserves. In other words, the total liabilities in the ordinary sense amount to $3,696,316.83 against net tangible assets of $13,505,965.87.

## NEW BURKART-SCHIER PLANT IN CHATTANOOGA

A large plant for the manufacture of sulphonated oils, softeners and textile specialties has been erected in Chattanooga by the Burkart-Schier Chemical Company. The company's former plant has been remodeled to contain its sulphonating and oil processing equipment. The warehouse in the rear of this plant now houses the chemical stock and equipment. In the new plant modern equipment has been installed and a testing and analytical laboratory included.

The company has placed in direct charge of its sulphonating operations a chemical engineer experienced in the sulphonating and processing of textile oils.

The personnel of the company is: C. S. Schier, president; J. A. Huff, Rockwood Mills; W. A. Bentel, secretary. Directors: F. A. Carter, American Textile Woolen Company; A. H. Thatcher, Standard-Coosa-Thatcher Company; W. J. Kelly, Jr., sales manager; E. L. Fletcher, chemical engineer. Included in the other stockholders are eight prominent textile mill men of Chattanooga and vicinity.

## SANDOZ APPEALS PYRAZOLON CASE TO SUPREME COURT

In a petition to the United States Supreme Court to review the decision of the Court of Customs Appeals, rendered last February, in its case involving the appraisement of an imported pyrazolon, the Sandoz Chemical Works, Inc., holds that the American selling price provision of the tariff law is unconstitutional. The original case concerned the assessment of the plaintiff's imported pyrazolon on the basis of $4 per pound, the American selling price of a comparable domestic product. The judgment of the board of general appraisers was, in this case, upheld in the United States Court of Customs Appeals, which at the time made a thorough investigation of the value of the domestic and imported products in an endeavor to determine the accuracy of the appraisement.

That appraisement of imported products on the basis of the American selling price of competitive products is an illegal delegation of power not within the rights of Congress is alleged in the appeal to the Supreme Court, Sandoz Chemical Works claiming that subdivision (f) of the tariff law of 1922 makes the controlling price "not merely the price at which the domestic product is freely offered for sale, but in the alternative, the price which the domestic manufacturer is willing to receive."

Furthermore, the determination of the assessment of imported products on the basis of the value of the American manufacturer's merchandise is also labeled in the petition as unconstitutional, the provision of Paragraph 27 being not so much a revenue measure as one "designed to give a monopoly to domestic manufacturers and placing in the hands of domestic producers the power to create a virtual embargo," constituting an invasion of the rights of the people.

By the decision handed down in the customs court, counsel for the petitioner states, "a domestic manufacturer has simply to announce to his representatives his willingness to sell his product at any stated price, in order to establish that price as the dutiable value of the imported merchandise, although that price may be grotesque-

ly in excess of the true value of the imported product."

As it is in the nature of a test case, upon the decision of which may depend the validity of the tariff protection now accorded the American dyestuff industry, the outcome of this appeal will carry with it an unusual significance to the industry.

## DYESTUFF DEALER BECOMES ARBITER OF FISTICUFFS

New England dyestuff circles were much interested by the announcement on Saturday, April 24, that Edward C. Foster, well-known dyestuff dealer of Providence, had been appointed by Governor Pothier to head the newly created Rhode Island State Boxing Commission. Mr. Foster has a host of friends in the textile-chemical fraternity and has been an ardent sportsman for many years. His appointment to this office speaks well for the future conduct of boxing bouts in his jurisdiction.

## NEW NATIONAL CHROME YELLOW

Among recent additions to the line of National dyes is National Superchrome Yellow 2G, a product said to yield shades that are somewhat greener than the well-known National Superchrome Yellow GN. The new type, according to the announcement, is distinguished by excellent fastness properties, solubility and level dyeing. It may be applied to wool by all three of the chrome dyeing methods and in any type of dyeing machine used for chrome colors. In dyeing worsted with cotton and artificial silk the latter are left entirely clear, making the product useful for decorative effects.

National Superchrome Yellow 2G is preferably dyed by the afterchrome method and will be found useful as a self-shade as well as for shading purposes. Product samples and full technical information may be obtained from any of the offices of the National Aniline & Chemical Company.

## RAYON DYESTUFFS IN GREAT BRITAIN

British dyestuff manufacturers see in the remarkable expansion of the rayon industry a considerable increase in the demand for special rayon dyes, according to Consul Maurice L. Stafford, London. Close attention is being given to the perfecting of dyes for rayon as it is reasonable to assume that most of the goods produced in Great Britain will be dyed there.

## DYEING OF THE INSOLUBLE AZO COLORS

(*Continued from page* 314)

its homologs is more stable especially if formaldehyde has been added to the prepare but prudence dictates the earliest possible development. The cloth should be cool before entering the developing liquor and in some cases may require forced cooling with air blasts.

The neutralized diazo solution is fed from a storage tank in which the temperature is maintained low by a floating cake of ice. The saturator box is of hard rubber or Monel metal, with a capacity just slightly larger than the guide roll, and surrounded with a jacket of cracked ice and water. The inflowing liquor is distributed the length of the box by a perforated pipe.

The small size of the saturator box and the ice jacket insures a maintainance of fresh undecomposed diazo liquor.

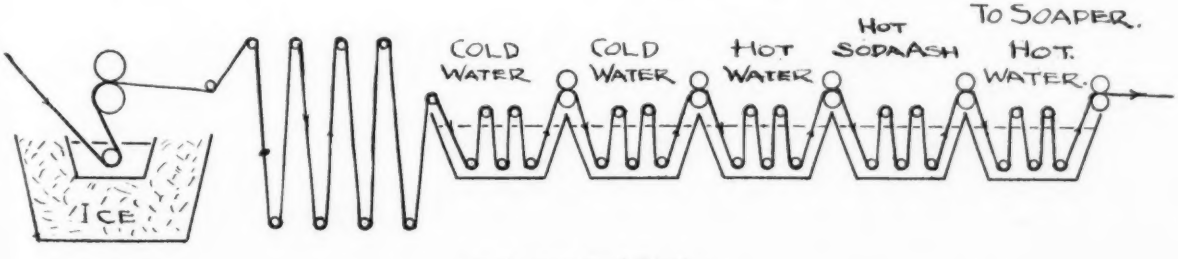
The cloth passes through the liquor, between the mangle rolls, and then over several skying rolls to allow time for complete coupling. A thorough water washing immediately ensues to remove the excess diazo solution. The cloth should receive several cold water rinses before entering the hot water, in order to remove most of the diazo liquor before decomposition occurs.

A thorough soaping must follow to remove all loose color and render the goods fast to crocking. Delay between the rinsing and soap will result in dulling of the shade.

The soaping may be executed in a rope soaper, in an open soaper with sky rolls or on the jig.

For colors with a beta-naphthol ground, the soaping may be done with a 1/10% soap solution at 160 to 180 deg. Fahr. For colors with a Naphthol AS or similar ground the soaping should utilize a solution of 1/2% soap and 1/10% soda ash at a temperature of 180 to 212 deg. Fahr.

The procedure of dyeing cotton yarn in skeins is similar to that employed in dyeing piece goods with the exception that it is unnecessary to dry the skeins after impregnating with naphthol. It is not necessary to kier boil the skeins, but it is considered advisable as it decreases crocking. The naphthol can be applied in an open box of Hussong dyeing machine. The excess liquor can be extracted in a hydroextractor and returned to the impregnating bath. The skeins must be beaten out to insure even distribution of liquor before entering into the de-




*Development and Rinsing*

veloping bath. Developing can be done advantageously in a rubber lined extractor. The skeins are laid in the extractor and the liquor pumped in and circulated until the color is fully developed. Excess developing liquor should be whizzed off and rinsing can be done in the same extractor without removing the skeins. Soaping should be done either on an open box or a soaping machine.

It will be noted that this is an intermittent process; but the steps can be so arranged, that, the time necessary for impregnation, extraction and beating out just equals the time for developing and rinsing, so that there will be no accumulation of yarn at any step,

Three tanks will be required for the solutions; one for the preparation of the naphthol, one for the preparation of the stock developer, and one for the storage of filtered dilute developer.

### Precautions

1. Add formaldehyde to the impregnation bath only and not to the stock solution.

2. Insure thorough extraction or uniform drying of the prepared material before development to avoir excessive crocking.

3. Avoid the use of any metals except Monel in the construction of apparatus containing developer.

4. Make up just enough developer for one day's run.

5. By adequate ventilation protect working men against the fumes of nitrous acid arising from diazotization.

6. Protect workmen against skin infections by the use of rubber gloves and armlitos.

7. Skin infections should be treated with lead acetate and alum solution.

## PROGRESS OF THE ITALIAN DYESTUFF INDUSTRY

The bulletin of the Italian Wool Association reports two notable achievements realized during the past year by Italian dye manufacturers. The first is the production of synthetic indigo on a commercial scale. This important dyestuff is now manufactured in Italy for the first time at the Bonelli Company's Cesano Maderno factory and has been on the market since the early part of 1925. It is stated that the Italian company has not only perfected this dye but has succeeded in producing at a cost which enables it to meet the long established foreign competition.

The second noteworthy accomplishment of the year is the production of Diamond Black, an azo wool dye. Initial production of this dye took place in the summer of 1925 at a small plant in Melagnano where the manufacture is still carried on.

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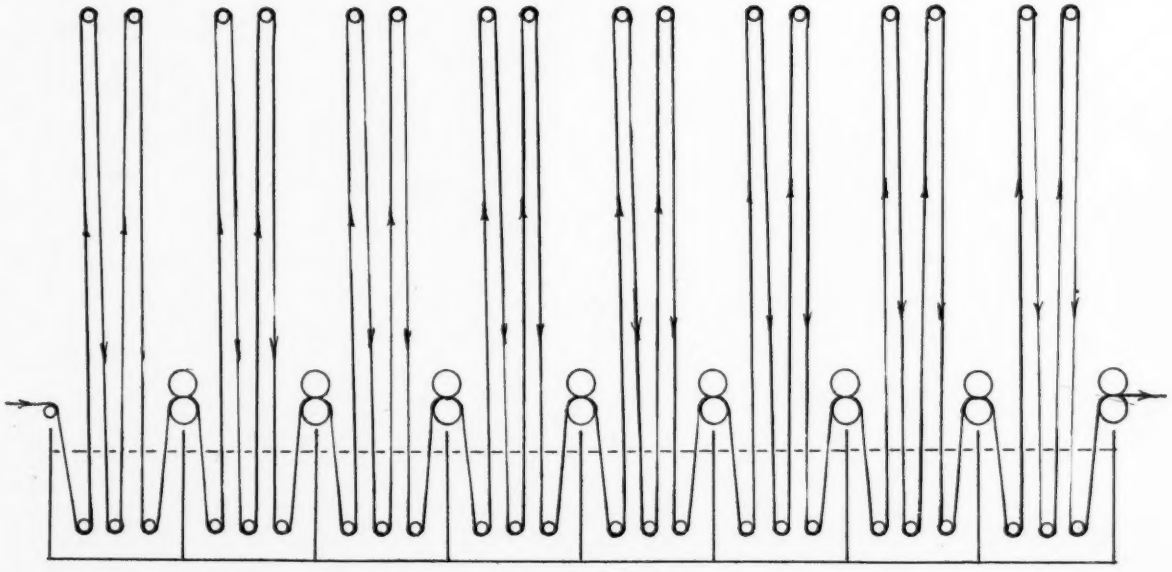
## TECHNICAL COTTON MAN WITH THE BORNE, SCRYMSER COMPANY

George F. Payne, a well-known New England cotton manufacturer formerly connected in a technical capacity with the Queen City Cotton Mills, Burlington, Vt.; Harmony Mills, Cohoes, N. Y.; Mt. Vernon-Woodberry Mills, Baltimore, Md., and Dominion Textile Company, Montreal, Canada, is now special technical representative for Borne, Scrymser Company. Mr. Payne will specialize particularly in the application of the Breton Minerol Process of oil spraying on cotton, in the continued development of which his high technical ability will be of value to mills to which his services are thus made available.



*Open Soaper with Sky Rolls*

# Technical Notes from Foreign Sources

### Leather Dyeing

Comparative tests on chrome-tanned and vegetable-tanned leather skivers with a range of acid, basic and direct coloring matters have shown that unmordanted chrome leather has a much greater affinity for the acid and direct coloring matters than vegetable-tanned leather. The hydroxyl group in the coloring matter is unimportant. The object of mordanting chrome leather is not to facilitate dyeing but to reduce the attraction between the leather and the coloring matter, thus producing more even shades. A better feel is produced on the finished leather if it has been mordanted. The dyeing of chrome leather with basic coloring matters is unsatisfactory unless the leather has been mordanted. Coloring matters with a reddish shade tend to appear more reddish when used on chrome leather. (Journal of the Society of Leather Trades Chemists, 1925, Vol. 9, pages 520 to 525.)

### Dry Dyeing Process

French Patent No. 591,075 describes a form of dry dyeing process. In this process designs are printed on fabric, paper and the like by means of a viscous color paste which is prepared by the addition of paraffine wax or a similar substance to a mixture obtained by the addition of an aqueous solution of an organic coloring matter; for example, Methyl Violet and lactic acid to a 25 to 50 per cent solution of a soap derived from stearic acid. Thereafter the printed fabric was calendered. Lactic acid may be replaced by citric, tartaric, malic or oxalic acid.

### Mordant for Cotton

The preparation of a mordant for cotton in the place of tannin is described in the process that is patented in French Patent No. 589,081. Hydrogenated aromatic hydrocarbons are treated with concentrated sulphuric acid, with or without preliminary oxidation.

For example, tetralin is oxidized with the aid of bromine water and phosphoric acid, the aqueous layer removed and the oxidation completed by treatment with air in the presence of ferric chloride, which acts as a catalyst. Any changed tetralin is distilled off and the resinous residue is rendered soluble in water by treatment with concentrated sulphuric acid. A similar mordant may be prepared by the direct treatment of tetralin with concentrated sulphuric acid, oxidation of the tetralin taking place simultaneously.

### Sulphur Content of Wool

Published results for the sulphur content of wool vary from half to five per cent. Whether keratin be either a single protein or a mixture of proteins, one would expect it to have a definite and not a variable composition. Variation in results may be due in part to faulty methods of analysis. In an article which is published in the Journal of the Society of Chemical Industry, Volume 45, pages 10 to 12T, there is given a comparison of the various methods of analyses used to determine the composition of the keratin in wool. The following modification of the Benedict-Denis method is then recommended as being the most suitable:

About 0.2 gram of wool is digested with pure sodium hydroxide solution, the latter being made with the aid of metallic sodium, until the wool has just dissolved. A drop of bromine is added, and after a few minutes the mixture is neutralized with nitric acid, 10 c.c. of the Benedict-Denis reagent are added and the determination of the sulphuric acid is completed in the usual manner. Different purified wools of known origin were analyzed in this manner. The percentage of sulphur showed but little variation, 3.42 per cent being the maximum, while the mean of forty experiments gave 3.22 per cent. It is contended that the sulphur content of wool is not variable as supposed hitherto, but practically constant.

### Dyeing of Cellulose Acetate Silk

By colorimetric measurements of the initial and the final concentration in the dye bath the amount of various direct cotton dyestuffs which have been purified by dialysis in tap water for fifteen days and then in distilled water for another fifteen days, taken up by the cellulose silk (Celanese), and the velocity with which the coloring matter is removed, have been determined and, in the case of water-soluble coloring matters, compared with the partition coefficient of the dye between water and ethyl acetate.

In many cases—for example, the phthaleins—the difference between the initial and the final concentration of the bath does not give a correct value for the amount of color that is taken up by the textile fabric, since there is a precipitation of color on the fiber surface, which means difficult any sharp distinction between colloid suspensions and macro-crystalline suspensions. The results are opposed to the theory of Clavel, but support the theory that the dyeing of silk is a phenomenon of solubilization of the color by the fiber by means of such groups as the hydroxyl and the amine (Witt and others). Contrary to Clavel's theory, it is found—for example, in the case of Eosine I—that the free acid and its ethyl ester have greater dyeing powers than the sodium salt. Then again, in the case of the water-soluble coloring matters it is a general rule that the more soluble the coloring matter and the

smaller its partition coefficient between water and ethyl acetate, the less is its affinity for the textile fiber.

The size of the particles is not important, as is shown by dry dyeing, and affects only the rate of diffusion into the interior of the fiber. In the case of insoluble colors it is shown, again contrary to Clavel's view, that a molecular dispersion will not dye the silk, but the finer the suspension the more rapid is the solubilization of the color. As an approximate rule it is found that if, in comparison with its molecular weight, the coloring matter is easily soluble in ethyl acetate, it will color artificial silk effectively. Colors developed on the fiber are mostly insoluble in water, and the rule for such colors applies here. The fiber in this case, however, becomes supersaturated with the dye, which crystallizes out in the interior of the fiber and, owing to its insolubility, is not removed by washing. (Helv. Chim. Acta., 1926, Vol. 9, pages 152-173.)

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### Mercerizing with the Aid of Nitric Acid

In the past two or three years there has been great interest manifested in the problems of treating vegetable fibers with acids, either for the purpose of changing the outward appearance of the fiber and endowing it with new properties in that direction, or in altering the fiber so that its dyeing propensities are changed. New mercerizing processes have been devised to this end.

One of these has been the use of nitric acid for mercerization. The action of nitric acid on the cellulose fiber may be summarized as follows: In the first place, the cotton fiber is shrunk about 10 per cent and its strength is increased in the neighborhood of 20 per cent. The process was carried out at a temperature of 15 to 28 deg. Cent. The optimum strength of nitric acid to employ for this purpose is from 40 to 41 deg. Be. The duration of treatment varies between wide limits; as, for example, between thirty seconds and twenty-one hours.

It has also been observed that the affinity of the fiber for the coloring matter increases progressively with the duration of the acid treatment, up to a maximum of twelve hours, and then decreases again. In order to avoid injurious action of the nitric acid on the fibers, it is necessary that they be very thoroughly washed after the treatment, and this is most advantageously carried out with the aid of a weak soda solution, 1 to 2 grams per liter. A solution of sodium sulphide may also be employed for this purpose.

Although the highest luster and the greatest affinity for coloring matter are obtained when the treatment with nitric acid is permitted to last for twenty-one hours, it is not wise to prolong the mercerization so long, for the reason that the fibers are injured by the acid. The reduction of the temperature of mercerization does not help very much in preventing the weakening of the fibers by the acid. On the other hand, under such conditions the affinity of the finished fiber for coloring matters is reduced.

Treatment with nitric acid of 40 to 41 deg. Be. for several minutes is sufficient to be noticed in the fact that the cotton becomes deeper dyed than ordinarily. A treatment which lasts for three hours gives the best results so far as the dyeing properties of the fabric are concerned. When the treatment is prolonged further, the affinity of the cotton for coloring matters and its strength as well are impaired.

There has been some question as to the nature of the cellulose derivatives which are formed by this treatment. It would appear as if the nitrated product lies between a bi- and tri-nitrate, a product which cannot be affected by washing either with water or with soda solution.

It has been estimated that the percentage of nitrogen which is combined with the cotton fiber is 7.7 per cent when the treatment of the cotton is effected with nitric acid of 1.40 specific gravity for a period of one hour. (Der Textilchemiker und Colorist, 1926, pages 5-6.)

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### Fast Colors on Silk

Formerly the dyer was much limited in his selection of coloring matters and processes for the production of fast colors on silk fabrics. With the exception of black, which was obtained with the aid of Logwood Black or Aniline Black, there were but few additional shades which could be obtained in a fast condition on silk, and most of these shades were produced with the aid of natural coloring matters. The use of the sulphur and vat dyes, which are known to be fast, was surrounded by the condition that they stand up against the strongly alkaline action of the color liquor.

It is not possible, however—at least, so far as the sulphur coloring dyes are concerned—to carry out the dyeing process in a bath that is almost neutral. The dyeing is carried out in such a manner that the sulphur dye is first dissolved in sodium sulphite and then sodium bisulphite is added to the color bath, until the solution shows only a weak alkaline reaction with phenolphthalein paper. In spite of this, the sulphur dyestuff remains in solution.

A very important factor is the temperature at which the coloring is conducted, as well as the concentration of the color liquor. The latter is best chosen at 1:50. The following temperatures are recommended for the different coloring matters given below: For yellow and brown, approximately 75 deg. Cent.; for blue, green and brown, 55 deg. Cent., and for black, approximately 60 deg. Cent.

The silk materials are introduced into the color liquor maintained at the proper temperature and the dyeing is carried out for one hour. The dye liquor is squeezed out of the fabric and then the latter is washed in cold water. In order to remove excess coloring matter it is advisable to wash the fabric a second time

with soap. This simple process gives very satisfactory results. When dyeing with sulphur colors which oxidize too quickly, it is well to add a little bicarbonate to the color liquor in addition to the bisulphite. Very light shades are obtained when one-quarter of the bisulphite is replaced by hydrosulphite. The colors produced in this manner on the silk are very fast to redyeing and to boiling. (Der Textichemiker und Colorist, 1926, page 8.)

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## SUMMARY OF PATENTS FOR 1925

THE following list of patents for dyes and colors, dyeing, bleaching, finishing and water-softening processes, and dyeing machinery was culled from the volumnous Index of Patents for 1925, recently issued by the Patent Office. It is a brief but practically complete index to all patents issued during last year that pertained especially to textile processing and dyeing materials, and consequently should be of particular interest to dyers, textile chemists and dyestuff manufacturers. Complete descriptions of any of these patents may easily be obtained by communicating with the Patent Office at Washington.

### DYESTUFFS AND TEXTILE CHEMICALS

Azodyes, Aminoarylakyltoluolsulfamid. H. Clingestein. 1,540,-164; June 2.

Azodyestuff. J. Haller. 1,529,739; March 17.

Azodyestuff and making same. K. Thiess. 1,564,328; July 14.

Azodyestuff, New. R. Stusser. 1,560,949; November 10.

Azodyestuffs and making the same. H. Wagner and O. Sohst. 1,522,089; January 6.

Azodyestuffs from nitrosocarbazol disulphonic acid and a primary amino compound. P. C. Scherer, Jr. 1,547,526; July 28.

Coal tar or its distillates into phenols and neutral oils, Disintegrating or decomposing. A. Weindel. 1,528,313; March 3.

Color-wave-projection apparatus. D. P. Ghadiali. 1,544,973; July 7.

Coloring matter. K. Holzach. 1,531,098; March 24.

Coloring matters produced by halogenating n-dihydro-1.2.1'2'-anthraquinone azin, Vat. P. Nawiasky and W. Krannich. 1,544,924; July 7.

Coloring matters, Production of. A. H. Davies, R. F. Thomson and J. Thomas. 1,531,260; March 24.

Coloring matters, Production of. A. H. Davies and R. F. Thomson. 1,531,261-3; March 24.

Colors, Production of pigment. C. Immerheiser and B. Zschimmer. 1,529,891; March 17.

Colors to plastic compositions, Applying. G. W. Brockus. 1,567,487; December 29.

Colors, Transferring. P. Yohans. 1,552,374; September 1.

Detergent. J. H. Weiss and R. Wotherspoon. 1,531,324, March 31.

Detergent. R. Wotherspoon. 1,531,328; March 31.

Detergent and making the same. R. L. Ginter. 1,524,394; January 27.

Detergent compound. B. L. Blatt. 1,567,902; December 29.

Dye and making same, Bluish sulfurized indophenolbenzidine. L. Haas and E. Reber. 1,565,736; December 15.

Dye-applying wheel. G. T. Thomayer. 1,545,988. July 14.

Dye, Basic. W. Konig. 1,524,791; February 3.

Dye, Disazo. R. C. Miller. 1,557,265; October 13.

Dye, Hair and fur. W. Kritchevsky and W. K. Nelson. 1,545,-500; July 14.

Dye, New ortho-hydroxyazo. O. Kaltwasser, H. Kirchhoff and H. Oehrn. 1,556,329; October 6.

Dye of the pyrone series, Wool. G. Kohres. 1,543,166; June 23.

Dye, Pyrone. M. Weiler. 1,532,790; April 7.

Dye solutions, Apparatus for reducing. F. A. Eustis. 1,535,-152; April 28.

Dye, Trisazo. A. L. Laska and A. Zitscher. 1,540,485; June 2.

Dyes and making same, Monoazo. A. L. Laske and A. Zitcher. 1,545,335; July 7.

Dyes and other solutions, Reducing Indigo. F. A. Eustis. 1,535,151; April 28.

Dyes containing a diphenylurea nucleus, Disazo. L. W. Geller. 1,538,934; May 26.

Dyes. Diphenyldicarboxylic acid disazo. R. Stusser. 1,538,-414; May 19.

Dyes, Halogenated naphthazine. W. Herzberg, G. Hoppe and H. Ohlendorf. 1,538,400; May 19.

Dyes, Manufacturing. W. Herzberg and G. Hoppe. 1,556,326; October 6.

Dyes of the pyrozolone series and making same, Azo. M. Boenizer. 1,539,347; May 26.

Dyes, Preparation of phenyl rosinduline. A. Wahl and R. Lantz. 1,555,535; September 29.

Dyes, Production of vat. H. W. Stiegler. 1,537,507; May 12.

Dyes, Sulphur. O. Spengler and A. Thurm. 1,532,640; April 7.

Dyes, Sulphurized. O. Spengler and K. Kreutzer. 1,536,731; May 5.

Dyes, Tetrakisazo. J. P. Penny. 1,549,214; August 11.

Dyestuff. G. de Montmollin and G. Bonhote. 1,534,506; April 21.

Dyestuff and making same, Brown trisazo. B. Vossen. 1,565,-344; December 15.

Dyestuff, and making same, Vat. J. G. Dinwiddie. 1,558,252; October 20.

Dyestuff and making same, Vat. W. Moser and H. Siebenburger. 1,527,900; February 24.

Dyestuff and making the same, Blue indanthrene. G. Kranzlein, P. Nawiasky, M. Corell, M. A. Kunz and F. Schutz. 1,541,156; June 9.

Dyestuff, Black vat. P. Nawiasky and E. Krauch. 1,546,859; July 21.

Dyestuff compound and making same, Albumen. O. Bally. 1,543,543; June 23.

Dyestuff containing sulphur and making same, Vat. E. Hoffa and H. E. Heyna. 1,537,928; May 12.

Dyestuff, Disazo. W. Bergdolt and L. Hauck. 1,538,373; May 19.

Dyestuff intermediate, Producing a. L. M. Shafer. 1,550,749; August 25.

Dyestuff, Monoazo. K. Thiess. 1,540,664-6; June 2.

Dyestuff, Triazine azo. G. Bonhote. 1,549,901; August 18.

Dyestuff of the anthraquinone series and intermediate products and making same, Indigoid. B. Mayer and W. Moser. 1,567,158; December 29.

Dyestuffs and making same, Azo. H. Fritzsche. 1,539,353; May 26.

Dyestuffs and making same, Azo. A. H. Schobel. 1,529,927; March 17.

Dyestuffs and making same, Azo. H. Wagner. 1,549,822; August 18.

Dyestuffs and making same, Indophenol sulphur. A. Goeschke. 1,534,518; April 21.

Dyestuffs and making same, New. J. Frohlich. 1,544,441; June 30.

Dyestuffs and making same, Vat. K. Wilke and J. Stock. 1,538,419; May 19.

Dyestuffs and making the same by condensing thioderivatives of benboquinones with arylamines, Vat. R. Herz. 1,530,670, March 24.

Dyestuffs and making the same, Quinonimide. A. G. Green, K. H. Saunders and E. B. Adams. 1,551,147; August 25.

Dyestuffs and making the same, Sulfonated oxy-dianthraquinonylamine. W. Mieg and H. Raeder. 1,564,091; December 1.

Dyestuffs, Brown sulphur. L. Haas. 1,531,925; March 31.

Dyestuffs, Complex chromium compounds of azo. H. Fritzsche, E. Reber and F. Straub. 1,529,995; March 17.

Dyestuffs containing chromium Production of. F. Straub. 1,551,073; August 25.

Dyestuffs, Indigoid. B. Mayer and J. Wurgler. 1,561,560; November 17.

Dyestuffs insoluble in water, Production of new azo. G. Kalischer and K. Keller. 1,558,890; October 27.

Dyestuffs, Manufacture of vat. H. Neresheimer. 1,562,468; November 24.

Dyestuffs of the anthraquinone series. J. Baddiley and W. W. Tatum. 1,540,733; June 2.

Dyestuffs of the anthraquinone series, Manufacture of vat. A. Luttringhaus and F. Kacer. 1,544,095; June 30.

Dyestuffs of the perylene series and the products obtainable thereby, Producing vat. K. Schirmacher and W. Eckert. 1,551,849; September 1.

Dyestuffs of the triphenylmethane series fast to alkali, Green-blue. R. Gesing and R. Reyher. 1,550,534; August 18.

Dyestuffs, Vat. A. Luttringhaus and P. Nawiasky. 1,522,251; January 6.

Mordant diazodyestuffs. E. Zehnter and E. Bodmer. 1,537,571; May 12.

## DYEING AND OTHER PROCESSES—DYEING MACHINERY AND EQUIPMENT

Bleach, Manufacture of. C. F. Vaughn and W. B. Leach, Jr. 1,523,847; January 20.

Bleaching and washing composition. B. S. Summers. 1,532,845; April 7.

Bleaching composition, Hat-. M. N. Terpinas. 1,538,261; May 19.

Bleaching machine. A. D. Merrill. 1,556,235; October 6.

Bleaching process. J. R. MacMillan. 1,547,138; July 21.

Bleaching process and means. W. O. Kaiser. 1,533,917; April 14.

Bleaching solution. H. M. Weber. 1,522,561; January 13.

Bleaching solution containing bromine compounds. H. M. Weber. 1,522,560; January 13.

Bleaching washed goods and apparatus therefor. M. G. Donk and W. D. Marshall. 1,550,518; August 18.

Calender and like smooth rolls, Doctor for. F. W. Vickery. 1,552,363; September 1.

Calender for textile and other materials. T. W. France. 1,535,660; April 28.

Calender rolls, Doctor for. O. Quante. 1,540,223; June 2.

Calendering. C. A. Rossbach. 1,541,396; June 9.

Calendering, embossing and cutting machine. J. A. McCrohan and H. C. Erich. 1,539,052; May 26.

Calendering machine. G. L. Hammond and W. Nicholas. 1,552,559; September 8.

Cellulose acetate, Dyeing or coloring of products made with. G. H. Ellis. 1,545,819; July 14.

Cellulose compound indifferent to substantive colors, Manufacture of a. R. Zimmermann. 1,523,742; January 20.

Cellulose esters for dyeing, Treatment of. R. Metzger. 1,532,427; April 7.

Cloth-singeing device. W. Osthoff. 1,532,260; April 7.

Color analyzer. C. W. Keuffel. 1,524,180; January 27.

Color combinations, Determining. H. H. Adler. 1,564,743; December 8.

Color effects on paper and fabrics, Producing. K. Franz. 1,548,261 August 4.

Color-fade-testing apparatus. L. J. Buttolph. 1,558,786; October 27.

Colorimeter. R. E. Klett. 1,535,070; April 21.

Colorimeter and nephelometer, Combined. W. L. Patterson. 1,522,592; January 13.

Color-matching device. R. E. Sleight. 1,566,046; December 15.

Color-sifting machine. J. Kazienko. 1,534,394; April 21.

Color, Measurement of. E. Ebie. E,540,768; June 9.

Cotton fabric. A. Bosshard. 1,526,201; February 10.

Cotton fabric having a linen-like finish resistant to wear and washing. E. R. Clark. 1,564,943; December 8.

Cotton fabric, Printed. W. J. Baxter. 1,529,109; March 10.

Cotton fabric, Treating. W. J. Baxter. 1,529,108; March 10.

Cotton fabrics, Imparting new effects to. A. Schonholzer. 1,5532,446; April 7.

Cotton fabrics, Process for production of transparent effects in. R. Zimmermann. 1,542,202; June 16.

Cotton-feeder cleaner. J. A. Streun. 1,526,394; February 17.

Dye vat, Raw-stock. F. M. Morton. 1,548,328; August 4.

Dyeing acetyl cellulose or fabrics containing the same and new products for use therein. J. Baddiley, A. Shepherdson, H. Swann, J. Hill and L. G. Lawrie. 1,534,019; April 21.

Dyeing and bleaching machine. W. S. Gates. 1,534,106; April 21.

Dyeing and like machine. I. Mitchell and G. H. Wordsworth. 1,525,085; February 3.

Dyeing apparatus. J. and J. Brandwood. 1,521,594; January 6.

Dyeing apparatus. F. C. W. Stelter. 1,531,997; March 31.

Dyeing articles, Machine for. F. Brown and G. Smith. 1,538,162; May 19.

Dyeing, bleaching and the like, Apparatus for packing caps for. W. Resch. 1,526,932; February 17.

Dyeing cellulose acetates. R. Clavel. 1,546,969; July 21.

Dyeing cellulose acetates. R. Clavel. 1,547,789; July 28.

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Dyeing lace, Method of and apparatus for. M. Schiesari. 1,527,446; February 24.

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Dyeing machine. J. H. Thompson. 1,565,037; December 8.

Dyeing or analogous treatment apparatus, Device for continuous feed of textile materials in lap form to. J. T. and J. Brandwood. 1,551,865; September 1.

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Dyeing sulphur colors on silk. F. L. Remlein. 1,551,330; August 25.

Dyeing textile and like material. M. Scholz. 1,533,769; April 14.

Dyeing textile fabric, paper and like materials. M. Scholz. 1,536,151; May 5.

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## NEWPORT THIANTHRENE PINK FB PASTE

A new pink said to be characterized by its clear bluish tone and good general fastness properties has been placed on the market by Newport Chemical Works, Inc., under the name Newport Thianthrene Pink FB Paste. It is said to reduce easily, exhaust slowly and penetrate well and consequently should be of value for all types of machine dyeing. According to the announcement, excellent printed patterns are produced on cotton, rayon and silk materials. The leaflet issued by the Newport Company describing this color contains swatches showing the shade on cotton, rayon and silk and gives dyeing directions and fastness properties.

## CANADIAN AGENCY FOR RAPIDASE

The American Rapidase Company, manufacturers of Rapidase, an enzyme for the desizing of fabrics, announces the establishment of a Canadian agency for this product, with the appointment of Messrs. Prescott & Co., Registered, 326 St. James Street, Montreal. By thus increasing its production and distribution facilities this manufacturer assures to Canadian mills prompt deliveries from local stocks.

## NEW PEERLESS DIRECT YELLOW

A leaflet describing the properties of Peerless Direct Fast Yellow SB has been issued by Peerless Color Company, Plainfield, N. J., and is being distributed to holders of the Peerless looseleaf shade card binder.

Direct Fast Yellow SB is described as a very concentrated dye having all of the characteristics of the well-known Chloramine Fast Yellows and corresponding to Diamine Fast Yellow but much stronger. While not so clear or bright as the Peerless FF or NN standards, according to the announcement it should find wide application where cost is an important factor. It is further claimed to be of excellent fastness to all color-destroying agencies and to be exceptionally level dyeing.

## NEW ADDITION TO INDIGOSOLS

An attractive leaflet issued by Carbic Color & Chemical Company, Inc., describes the properties of Indigosol Black TB and exhibits three novel print effects on swatches. This color is the latest addition to the series of Indigosols manufactured by Durand & Huguenin S. A., Basle. It is used for the production of black and gray shades and, like the others in the series, is described as soluble in water and quite stable. It is primarily used for calico printing, both for print-ons and resist styles. It may also be employed for shading purposes in conjunction with other Indigosols.

The stability of unsteamed prints produced with Indigosol Black TB and with the other Indigosols is said to be good, and it is as a consequence suitable not only for machine printing but also for block and yarn printing. Its fastness to light, washing and chlorine is also described as good.

This color is best developed by the steaming process, and resisted with Hydrosulphite NF Conc. or Rongalite C. For color resists the nitrosamines of the insoluble azo dyestuffs as well as all the brands enumerated in pattern card Sol. K.2 issued by this manufacturer, are suitable. The folder describing Indigosol Black TB gives printing receipts for its use alone and in combinations.

## NEW SCARLET ANNOUNCED BY DU PONT

A new scarlet prepared especially for use in the manufacture of typewriter ribbons has been placed on the market by the Dyestuffs Department of E. I. du Pont de Nemours & Co. under the name of Du Pont Brilliant Scarlet Extra Pure.


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## TEXTILE CHEMIST

Textile chemist desires responsible position. Has had fifteen years' experience in cotton yarn and cloth bleaching, dyeing and finishing plants. Wide knowledge of new artificial silk processing and fast color work, including vats and aniline black. Excellent references. Box 338, American Dyestuff Reporter.

## CHEMIST

Chemist, to act in capacity of assistant. Must have technical and practical experience in processing cotton yarns. State age, education, experience and salary. Reply to Box 340, American Dyestuff Reporter.

**Wanted—Copies of the American Dyestuff Reporter for May 3, 1926. Copies received will be paid for at the rate of 25 cents each. Howes Publishing Company, 90 William Street, New York City.**

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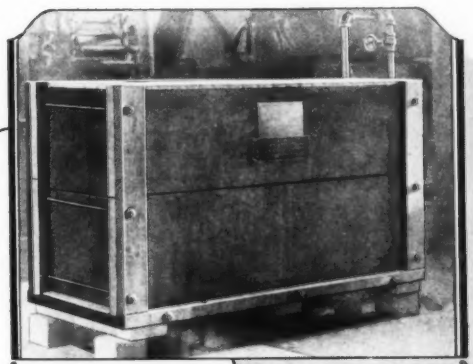

*One of several Monel Metal-lined wood dye-kettles with Monel Metal false bottom, partition outlet, etc. fitted with Monel Metal tubing, etc. installed at Lowell Textile School, Lowell, Mass. by New England Tank & Tower Co. of Everett, Mass.*

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PROF. OF CHEMISTRY AND DYEING
LOWELL TEXTILE SCHOOL

December 19, 1925.

International Nickel Company,
67 Wall Street,
New York City

Attention: Mr. E. A. Turner

Dear Sir:-

I am in receipt of the discs of Monel Metal, and also your letter of December 10th. We can make use of these from time to time in our dyeing experiments.

We have used the Monel Metal lined dye vat with great satisfaction for direct cotton colors, acid dyes, mordant dyes and mordant acid or after chrome dyes, and in no case have experienced any difficulty. The coil is also working well.

We have used the tub also quite a little for stripping with hydrosulfite, and seem to have met with no difficulties in this respect. We have not, however, used it in the dyeing of vat dyes, simply because we have had no occasion to do so as yet.

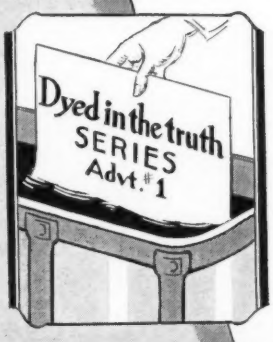
The pail and dipper have been very useful indeed and we have used them for about everything except sulfur colors.

We have not used the tub for basic dyes or for mordanting with tannin as yet.

Thanking you for past courtesies, I am,

Very truly yours,

L. A. Olney



*Exterior view of Lowell Textile School where Mr. Olney is Professor of Chemistry and Dyeing.*

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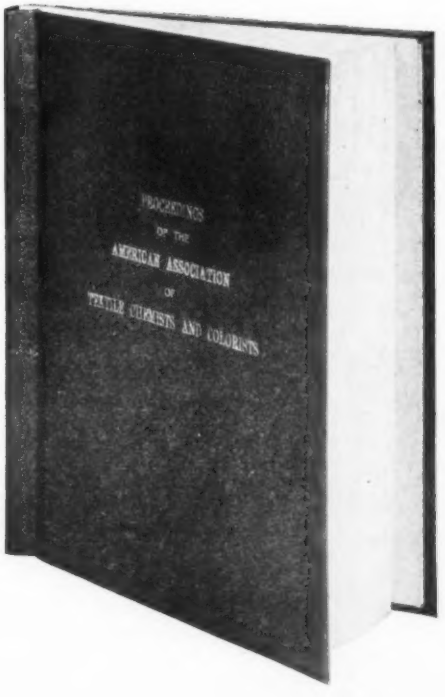

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assisted by

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